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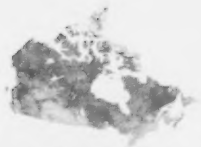
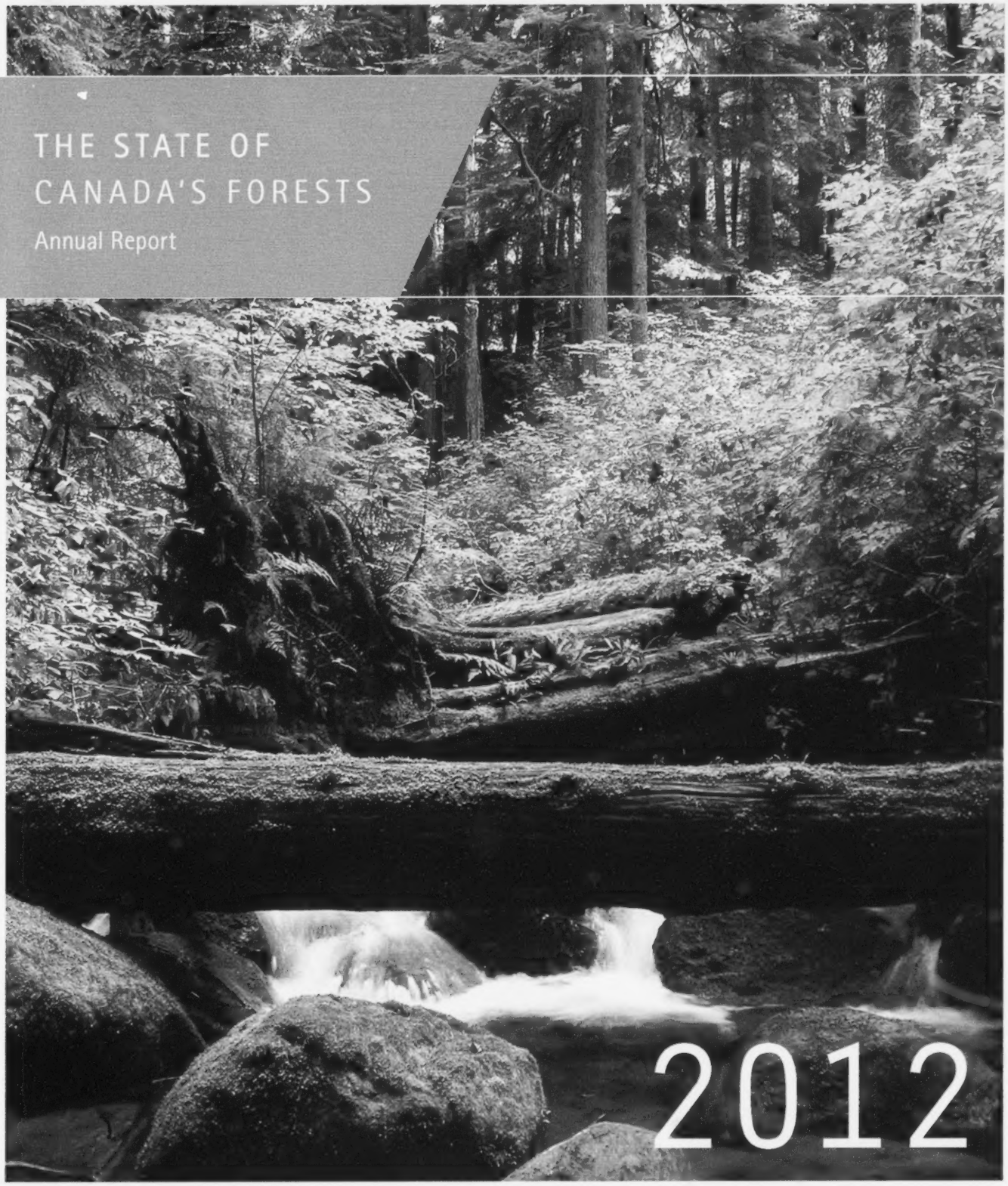


THE STATE OF CANADA'S FORESTS

Annual Report



2012

Canada

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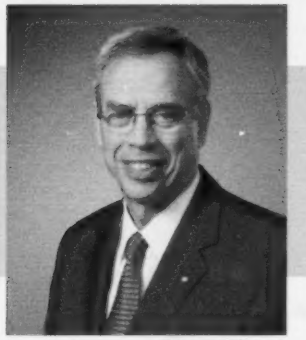

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MESSAGE FROM THE MINISTER OF NATURAL RESOURCES

As the pages of this year's *The State of Canada's Forests* report demonstrate, the past year has been a testament to the resilience of Canada's forest sector, the excellence of its products and the significance of its economic contribution. Canada's forest products exports are now just 6% away from the peaks recorded in 2008, and innovation, expertise and the quality of our wood fibre are at the heart of this success.

The sector's ongoing transformation is based on a strong partnership between industries, research organizations and governments. In 2011–2012, our government helped foster innovation, created opportunities abroad and defended Canada's interests with trading allies. At the same time, the industry spared no effort in reinventing itself and extracting more value from wood fibre by developing new innovative products.

The "Year in Review" section of this report provides a summary of our combined accomplishments, and the statistics speak for themselves. It is my pleasure here to draw your attention to a few notable highlights.

This past winter, our government announced a two-year extension of the Softwood Lumber Agreement with the United States, providing continued stability in the access we have to our primary market.

We also made significant progress in diversifying our markets. Last November, I saw first-hand how government investments are helping Canadian companies form new partnerships. In China, I participated in a ribbon-cutting ceremony for two four-storey wood-frame apartments—now the nation's tallest—in an area known for its green buildings and urban design. And in Japan I had the honour of announcing the provision of $4.5-million worth of lumber from British Columbia to help reconstruct public buildings destroyed by the devastating tsunami of March 2011.

Here at home, a number of exciting programs provided a catalyst for many first-in-Canada applications and innovative technologies. One of them, the Investments in Forest Industry Transformation Program, sponsors projects that implement new technologies with the goal of commercializing non-traditional, high-value forest products.

Earlier this year, I was in Windsor, Quebec, for the opening of one such project—the world's first commercial-scale producer of nanocrystalline cellulose. This renewable, non-toxic nanomaterial is being extracted at the new CelluForce facility and can be used in an enormous range of existing products to increase their strength and durability.

Lastly, I'm proud to report that today our pulp and paper mills are more innovative, diversified and competitive. Through Canada's largest forest industry initiative, the $1-billion Pulp and Paper Green Transformation Program, mills have reduced their greenhouse gas emissions by more than 10% and increased their renewable power by more than 200 megawatts—in some cases even making excess power available to local communities.

As the following pages clearly show, together we have achieved a great deal. And, through both long-established and new partnerships, we can expect to achieve even more as we continue building a more prosperous future for our forest sector and the communities across Canada that depend on it.

The Honourable Joe Oliver, P.C., M.P.
Minister of Natural Resources

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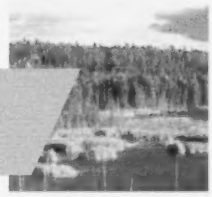

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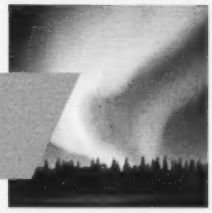

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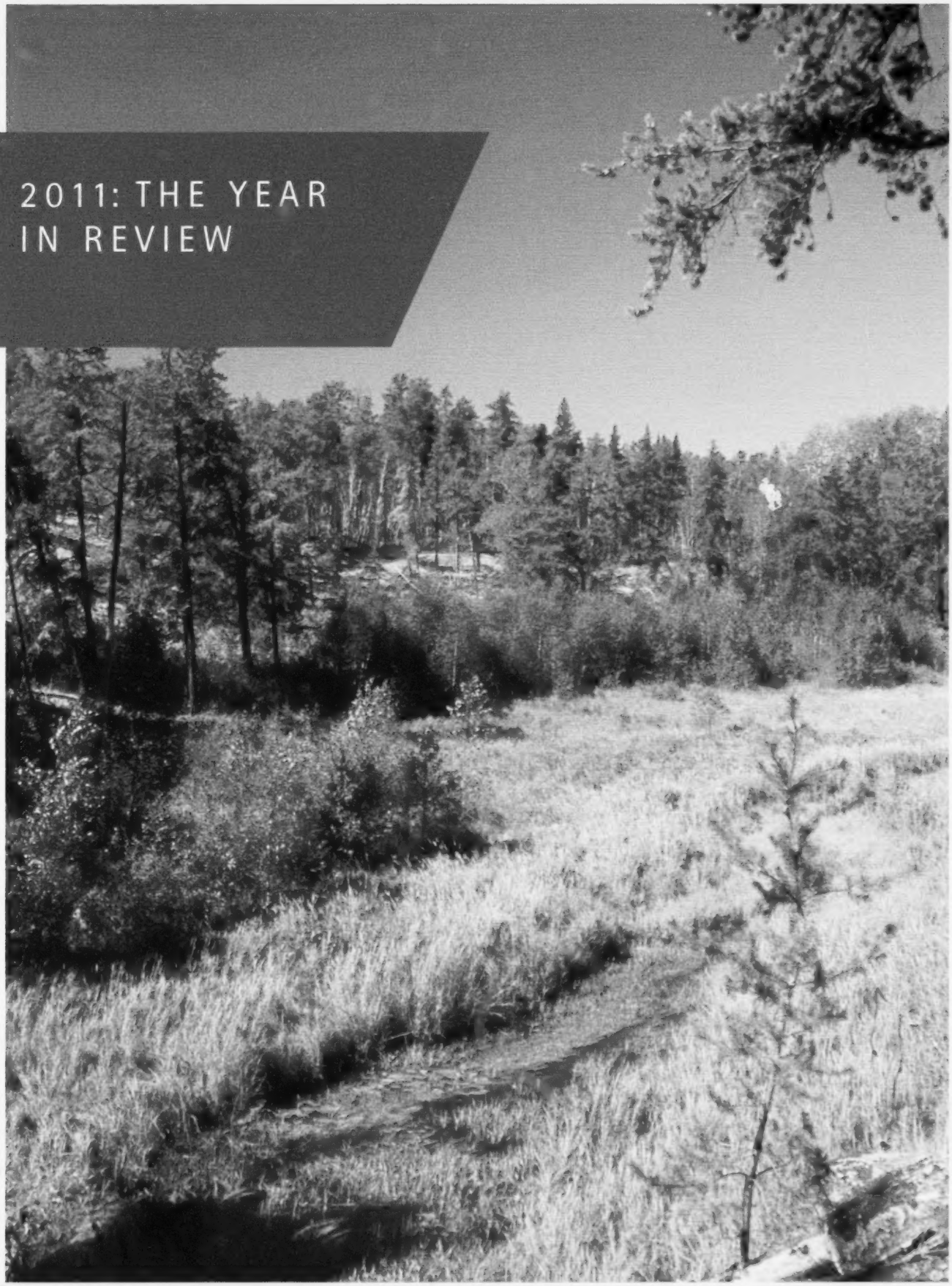
2011: THE YEAR IN REVIEW



The Canadian forest sector has faced several extreme challenges over the last decade. Cyclical downturns in the U.S. and in the global economy have been especially difficult for the industry, which depends heavily on exports to the U.S. and overseas markets. Added to this has been the combination of structural shifts that have exerted unprecedented pressure on the sector. These include the collapse of newsprint demand, the growth of low-cost overseas competition, the strong Canadian dollar, and the impact on wood fibre supply by western Canada's mountain pine beetle epidemic.

However, while the overall economic outlook remains uncertain and segments of the industry continue to struggle, the forest sector in fact saw exciting signs of recovery and transformation in 2011. New investment in the industry, the reopening of mills, the development of innovative new processes, and growth in new markets all point to progress being made—from change as a concept to change as a reality.

The forest sector today has a new vision of itself, rooted in a very different paradigm and business model from those of the past—a vision that embraces new technologies, new markets and sustainable forest management. As a growing range of stakeholders buys into this new vision, Natural Resources Canada–Canadian Forest Service (NRCan–CFS) continues to work closely with industry, the provinces and territories, and the research community to help make it a reality.

Accelerating the processes of transformation and innovation

The forest sector's progress in moving towards transformation and innovation has been aided by Government of Canada programs such as the Pulp and Paper Green Transformation Program, the Investments in Forest Industry Transformation Program and the Transformative Technologies Program. For example:

- The Pulp and Paper Green Transformation Program (PPGTP), which ended in March 2012, significantly improved the environmental performance of Canadian pulp and paper mills. Projects completed under the program are expected to add nearly 200 megawatts of renewable electrical capacity, save enough energy to heat the equivalent of all of the houses in Québec City on an ongoing basis, and reduce the greenhouse gas emissions of the Canadian pulp and paper industry by more than 10% from 2009 levels.

  In creating a solid and sustainable foundation for future investments, the PPGTP has readied the industry for the next phase of transformation.

- The Investments in Forest Industry Transformation (IFIT) Program meets a key need to help move new products and processes closer to commercialization. It does this by supporting "first of a kind" investments. The considerable interest in IFIT within the Canadian forest sector—reflected in two highly successful calls for proposals—demonstrates industry's desire to move towards implementing highly innovative technologies in the areas of bioenergy, biochemicals and new solid-wood products.

  Among IFIT's first-of-a-kind investment projects was co-funding the implementation of Alberta-Pacific Forest Industries' commercial-scale biomethanol extraction project, one of the first in the world, which is highly replicable and originates from Canadian research efforts.

- In January 2012, the world's first commercial-scale producer of nanocrystalline cellulose (NCC) opened in Windsor, Quebec. The CelluForce facility was developed by FPInnovations and Domtar Inc., with support from the Government of Canada (through the PPGTP and the Transformative Technologies Program) and the Government of Quebec.

  This project represents a landmark in the development of a new series of renewable industrial and consumer products created from wood fibre. In addition to being abundant, renewable and biodegradable, NCC is non-toxic—a significant advantage over most other existing nanomaterials.

While it is technological innovations such as NCC that are helping open new and high-value markets for Canada's forest sector, innovation is not always about revolutionary products. Sometimes innovation involves taking a traditional product and finding new uses and markets for it.

Pulp is a good example. Up until a few years ago, it was used mainly to make boxes, paper and tissue. However, as demand for pulp, especially for paper-making, fell, many mills were forced to close. Today several of those same facilities have been repurposed and are producing dissolving pulp (a type of wood pulp with a high cellulose content), which is shipped to Asia and used to make rayon for textile manufacturers. This shift has helped maintain jobs in Canada's forest-dependent communities.

Transformation and innovation in the forest sector are also leading to an increase in the participation of Aboriginal people as landowners, entrepreneurs, decision-makers and wage earners in the sector.

Under the Government of Canada's Federal Framework for Aboriginal Economic Development, NRCan–CFS uses its role as both facilitator and forestry expert to build new relationships across sectors, departments, industry and levels of government to strengthen Aboriginal participation in the forest sector. It also works to advance economic opportunities for Aboriginal people in the sector by coordinating federal participation and sharing information.

The Aboriginal Forestry Initiative, implemented in 2011, supported 16 projects in First Nations and Métis communities. Investment in the initiative has come from Aboriginal Affairs and Northern Development Canada, NRCan, other federal agencies and a number of provinces. The projects—including construction of biomass production facilities, skill development for harvesting and processing, value-added production using local fibre supplies, land tenure research, and feasibility and marketing studies—offer significant potential for driving economic development in the regions they are based.

Harnessing research capacity to strengthen innovation

The forest sector has increasingly pursued innovation, recognizing it as a key path both to enhanced economic competitiveness and improved environmental sustainability.

Supporting this effort are numerous strategic and targeted alignments: across research networks; among the key players in the innovation system (industry, governments and academic institutions); and among those with extensive knowledge of specific market needs and interests. And, in a focused approach to innovation, research and educational institutions are an essential element, bringing together individuals with a mix of expertise and skills and fostering the many benefits of dynamic teamwork.

In the fall of 2011, Forest Innovation by Research and Education (FIBRE), a unique "network of networks," was launched. Through the deliberate alignment of academic capacity with the forest sector's transformation agenda, FIBRE is now ready to draw on the capacity of 27 Canadian universities, more than 100 academics and about 400 students and postdoctoral fellows.

Two of the FIBRE networks are the *Innovative Green Wood Fibre Products Network* and *ForValueNet* (*Forest Management for Value-Added Products*).

- The Innovative Green Wood Fibre Products Network, centred at McGill University, is focused on creating technology for developing green products from wood fibres to replace fossil-fuel-based and other non-renewable products.

  Early success is already being achieved. An example is the invention of new textile yarns, being developed with FPInnovations. These new yarns could be an alternative to commercial fibres such as rayon and Lyocell, which are expensive to produce.

- ForValueNet, centred at Laval University, is developing a series of new and integrated models to support value-added wood decision-making strategies for Canada's boreal forest.

  The tangible benefits of this network include: the opportunity to help more than 50 graduates and postdoctoral fellows gain the required experience and qualifications to pursue ongoing work in the forest sector; the creation of new knowledge about boreal forest growth, wood quality, wood science, industrial engineering and manufacturing of value-added wood products; and the establishment of a world class network of scientists with expertise in developing an integrated decision-support system for value-added wood products manufacturing and forest management.

Other unique arrangements among key members of the forest sector innovation system are adding to Canada's strength both at home and internationally.

FPInnovations, for example, already plays a pivotal role in forest sector innovation. As the hub of the forest sector innovation system in Canada, it is working collaboratively with FIBRE and other forest stakeholders to align research activities and promote further transformation of the sector.

The Canadian Wood Fibre Centre (CWFC) is another example. The CWFC is a collaborative effort between NRCan–CFS and FPInnovations, designed to increase the economic return from Canada's forest resources through "upstream" forest-level research services.

Work being done by CWFC researchers together with their provincial, industry and academic partners has also led to the development and implementation of enhanced forest inventory systems that are facilitating greater precision in forest management, at reduced cost and increased profitability. Technologies such as airborne LiDAR (light detection and ranging) are being used to better predict fibre supply attributes, build more efficient and environmentally sound road systems, and identify key habitat features and sensitive areas. The enhanced inventory data are helping to optimize both harvesting and mill operations within a sustainability context.

Another increasingly important area of research is genomics. Researchers from several organizations, including Genome British Columbia, the University of British Columbia, Genome Canada, FPInnovations, the Canadian Food Inspection Agency and NRCan are working together on a range of projects expected to offer substantial benefit to the forest sector. For example, DNA-based diagnostic tests to identify and monitor forest pathogens are being designed, with the aim of giving forest managers fast and accurate tests for on-site use.

All of these innovative approaches combined are contributing to the transformation and strengthening of Canada's forest sector while providing invaluable tools for the sustainability of Canada's forests.

Diversifying markets

A key component of the new vision for the Canadian forest sector is the diversification of markets, aimed at avoiding dependence on any single market. With traditional markets in the U.S. still weak, NRCan–CFS is working in partnership with industry and the provinces to promote the benefits and attributes of Canadian wood products abroad. These collaborative efforts to develop new markets for Canadian products have begun to see real success, especially in Asia.

China is now Canada's second-largest trading partner after the U.S. and represents the fastest growing export market for Canadian wood products. Exports of these products have expanded dramatically, increasing from $32 million in 2001 to more than $1.46 billion in 2011—a 45-fold increase over that 10-year period. Lumber accounted for the largest share, with exports totalling $1.14 billion. Export growth to China since July 2009 has alone helped ensure that 18 Canadian sawmills have reopened or dedicated part of their production to serving the Chinese market.

Prime Minister Stephen Harper highlighted this growing trade relationship during a visit to China in February 2012. The Prime Minister, together with Minister of Natural Resources Joe Oliver, attended the official opening of the China-Canada Green Building Design Center, one of the largest wood frame buildings in China. The 2500-metre facility features environmentally friendly, seismically stable and energy-efficient Canadian wood frame technologies and materials.

Prime Minister Stephen Harper and his wife admiring a display at the China–Canada Green Building Design Center.

Market diversification efforts have also helped expand Canadian exports of wood products to South Korea—a total of $201.9 million in 2011, an increase of 39.9% over 2010. An earthqu[illegible]nd tsunami restoration project underway in Sendai, Japan, is also using Canadian wood products. And there are new efforts to expand markets in India and the Middle East.

Forests and sustainability

Increasingly, domestic and international markets expect forest products to come from sustainably managed forests. Canada continues to build on a strong record of sustainably managing its forest resources.

Sustainable forest management means balancing the broad range of forest-related values within a constantly changing economic, environmental and social context. As the forest sector continues to transform the industry through new technologies and new markets, a healthy and productive resource base must be maintained.

Despite the recent challenges faced by the forest industry, Canada is making significant progress toward sustainable forest management.

For example, third-party forest certification continues to increase, sending the message to new and emerging markets that Canada's forest products come from legal and sustainable sources and are produced through practices that comply with rigorous forest management laws and regulations. Today Canada has the largest area of certified forest in the world: 40% of the world's total.

Less than 0.2% of all forest and other wooded land in Canada is harvested each year—well below the level needed to maintain sustainable stands. The rate of deforestation (meaning the permanent conversion of forest land) is declining. And the forest sector's overall greenhouse gas emissions have decreased by 51% over the past two decades, through decreased reliance on fossil fuels, increased energy efficiency and reduced energy use.

Looking ahead

The Government of Canada has provided significant support for the transformation of the forest sector through a suite of innovation and market development programs. Economic Action Plan 2012 renewed this support through an additional $105 million over two years. While recognizing restraint, this funding represents a refocusing of efforts and resources.

Two new programs will continue to support forest sector transformation.

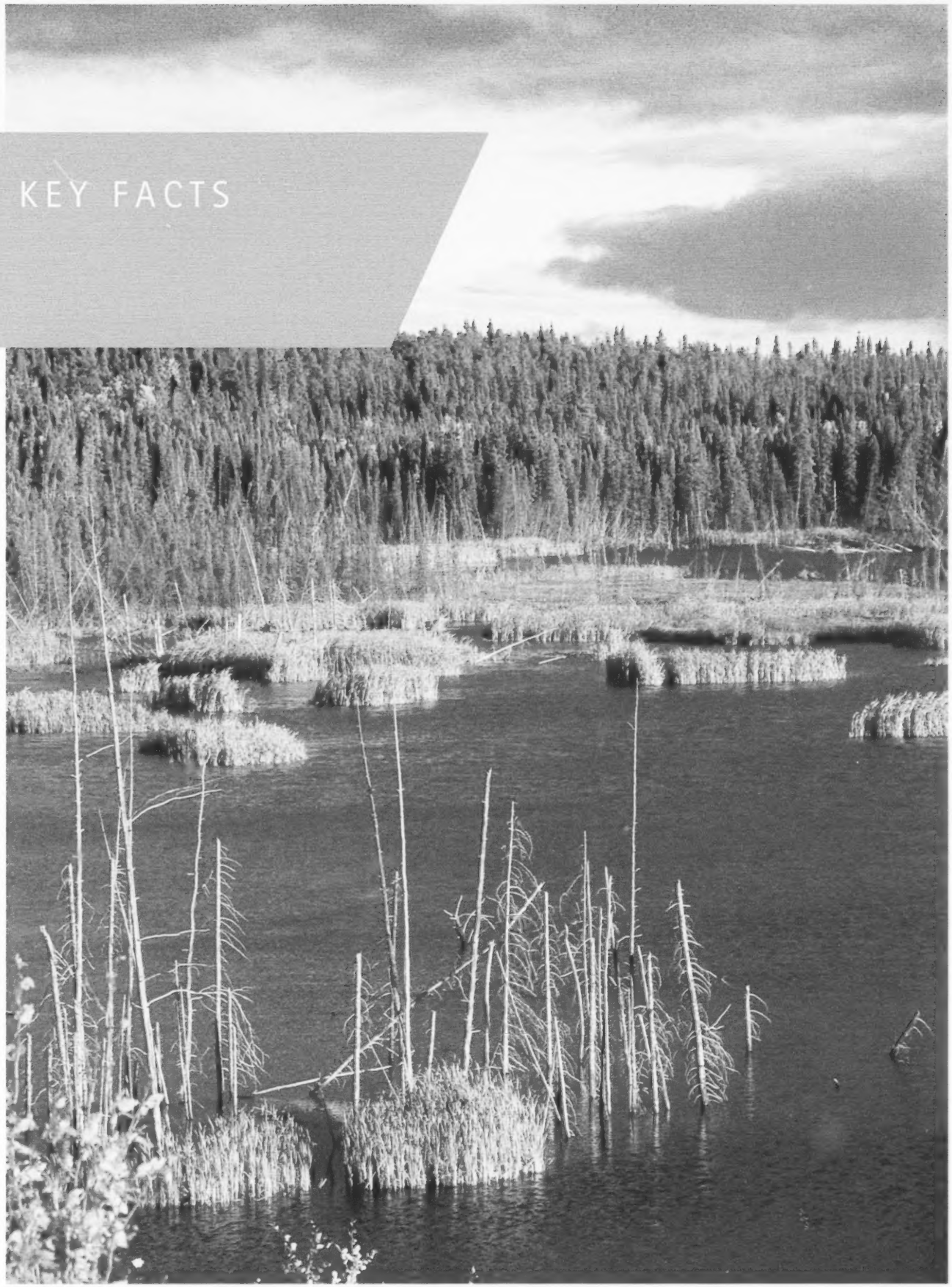
- The Forest Innovation Program will support the emergence of transformative technologies and the transfer of technologies to small and medium-sized enterprises.

- The Expanding Market Opportunities Program will help Canadian wood producers diversify and expand export opportunities for their products in traditional and emerging overseas markets, increase the use of wood in non-residential construction in Canada and the U.S., and promote the Canadian forest industry's strong reputation for the practice of science-based sustainable forest management.

Through these programs, the forest sector will continue to evolve, deepening partnerships among federal and provincial governments and industry, and looking for opportunities to build synergies with partners and others, both at home and internationally. At the same time, the federal government will continue to work with the forest industry to identify opportunities for increasing private sector investments in innovation and to develop new markets for Canadian forest products.

Innovation and the science that supports it will continue to be the key to the health and well-being of our forests, and the communities and industries that depend on them.

KEY FACTS



Society

Most of Canada's forest land (93%) is publicly owned (that is, "Crown land"): 77% is under provincial or territorial jurisdiction and 16% is under federal jurisdiction.

The remaining 7% of forest land is on private property belonging to more than 450 000 private landowners.

The provinces and territories have legislative authority over the conservation and management of the forest resources on the Crown land in their jurisdictions.

The federal government has legislative authority over forest resources where those resources affect, or are affected by, matters related to: the national economy, trade and international relations; federal lands and parks; and the government's constitutional, treaty, political and legal responsibilities for Aboriginal peoples.

In 2011, direct employment in the Canadian forest industry fell slightly (by 1.8%) compared with the 2010 employment level.

For about 200 communities across Canada, the forest sector makes up at least 50% of the economic base.

About 80% of all Aboriginal communities in Canada are in forested areas.

Public participation is an important aspect of forest management planning in Canada.

There were 12.5 million person-visits to Canada's national parks in 2011.

Economy

By value, Canada is the world's leading exporter of softwood lumber, newsprint and wood pulp; and the fifth largest exporter of wood panels and printing and writing papers.

The forest industry contributes about 1.9% to Canada's gross domestic product.

The U.S. is by far the largest buyer of Canadian forest products.

Environment

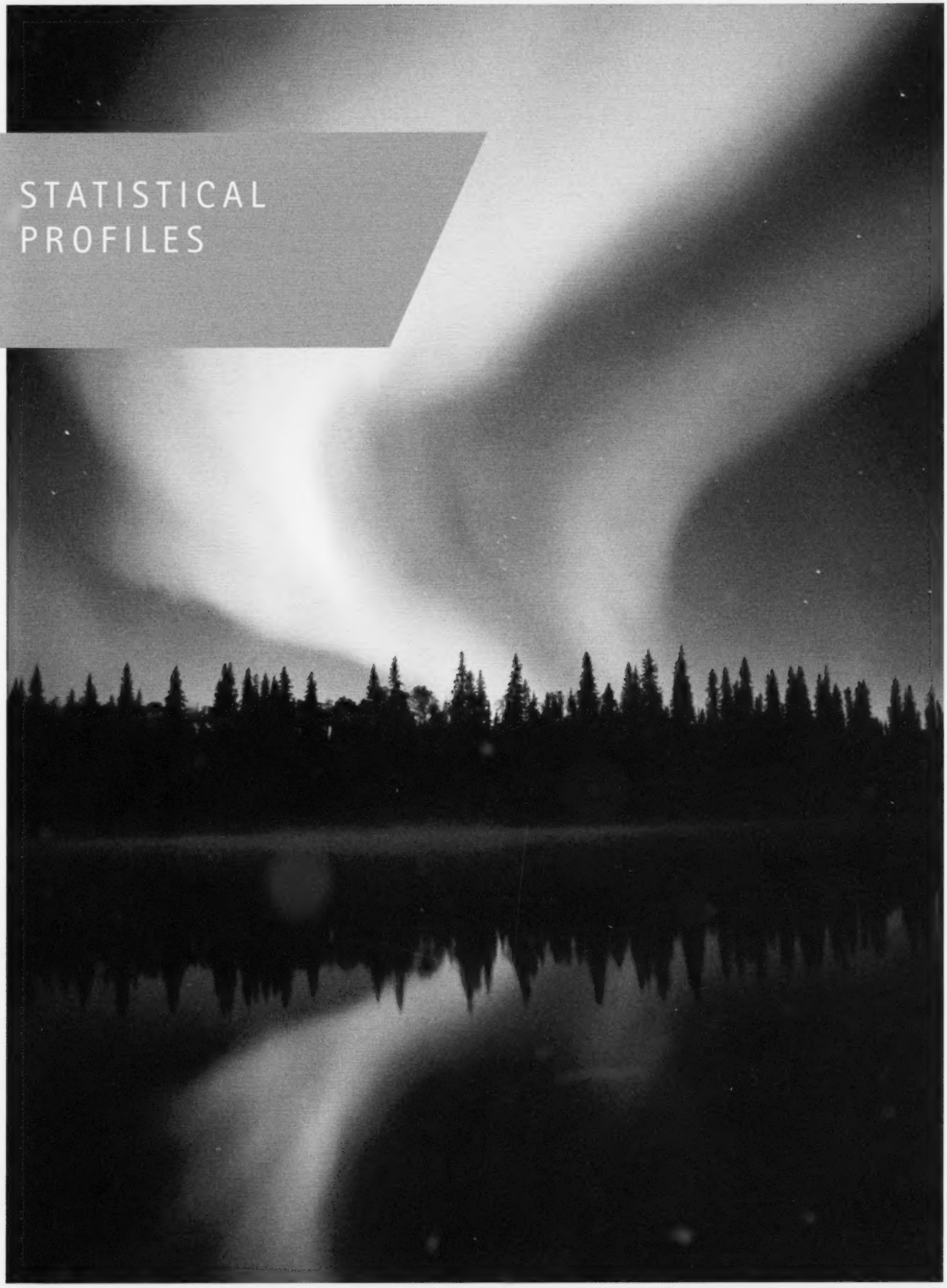
Canada has 397.3 million hectares of forest, other wooded land and other land with tree cover. This represents 10% of the world's forest cover and 30% of the world's boreal forest.

Less than 0.2% of Canada's forests are harvested annually.

By law, all forests harvested on Canada's public land must be successfully regenerated.

As of December 2011, Canada had 150.6 million hectares of forests certified as being sustainably managed under one or more of three globally recognized certification systems.

Bioenergy accounts for 58% of the total energy used by the forest industry, with the pulp and paper sector meeting some 63% of its energy needs from forest biomass.



STATISTICAL PROFILES

CANADA

Population (April 1, 2012) · 34 670 352

Maple

DOMESTIC ECONOMIC IMPACT	
Canadian housing starts (2011)	193 258
Contribution to GDP (constant 2002 dollars) (2011)	**23 688 000 000**
Forestry and logging industry	5 228 000 000
Pulp and paper product manufacturing industry	8 543 000 000
Wood product manufacturing industry	9 917 000 000
Direct jobs (number) (2011)	
Labour Force Survey	233 900
Survey of Employment, Payrolls and Hours	188 791
Expenditures – capital (dollars) (2011)	**2 143 800 000**
Forestry and logging industry	206 800 000
Pulp and paper product manufacturing industry	1 084 800 000
Wood product manufacturing industry	852 200 000
Expenditures – repair (dollars) (2010)	**2 582 800 000**
Forestry and logging industry	324 300 000
Pulp and paper product manufacturing industry	1 388 200 000
Wood product manufacturing industry	870 300 000
Revenue from goods manufactured (dollars) (2010)	**53 795 417 000**
Forestry and logging industry	7 766 627 000
Pulp and paper product manufacturing industry	25 771 275 000
Wood product manufacturing industry	20 257 515 000
Wages and salaries (dollars) (2010)	**8 830 758 000**
Forestry and logging industry	1 355 235 000
Pulp and paper product manufacturing industry	3 600 692 000
Wood product manufacturing industry	3 874 831 000

FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	12 731 529
Area planted (hectares) (2010)	390 285
Area seeded (hectares) (2010)	11 111
Fire – area burned (hectares) (2011)	2 603 833
Fires – number (2011)	4 608
Forest area certified (hectares) (2011)	150 567 044
Harvest area (hectares) (2010)	687 672
Harvest volume (cubic metres) (2010)	142 013 000

GREENHOUSE GAS INVENTORY	
For forest lands affected by land-use change (2010)	
Afforestation – forest area (kilohectares)	Not available
CO_2e removals from the atmosphere due to afforestation (megatonnes)	–1
Deforestation – forest area (kilohectares)	44.8
CO_2e emissions due to deforestation (megatonnes)	18
For managed forests (2010)	
Area of managed forests (million hectares)	229
Net greenhouse gas release to the atmosphere (CO_2e/yr) (megatonnes)	69
Net accumulation in forest biomass and dead organic matter (CO_2e/yr) (megatonnes)	–220

FOREST PRODUCTS	
Domestic consumption	
Lumber – hardwood (cubic metres) (2011)	1 946 109
Lumber – softwood (cubic metres) (2011)	24 028 728
Newsprint (tonnes) (2011)	780 033
Printing and writing paper (tonnes) (2011)	1 416 000
Structural panels (plywood and oriented strandboard) (cubic metres) (2011)	3 586 500
Wood pulp (tonnes) (2011)	8 840 730
Production	
Christmas trees (dollars) (2010)	35 833 000
Christmas trees (number) (2010)	1 796 000
Lumber – hardwood (cubic metres) (2011)	865 700
Lumber – softwood (cubic metres) (2011)	52 743 900
Maple products (dollars) (2010)	285 250 000
Maple products (litres) (2010)	42 742 625
Newsprint (tonnes) (2011)	4 382 000
Printing and writing paper (tonnes) (2011)	3 772 000
Structural panels (plywood and oriented strandboard) (cubic metres) (2011)	6 239 430
Wood pulp (tonnes) (2011)	18 287 000

INVENTORY	
Area classification (thousand hectares)	
Forest land	347 710
Other land with tree cover	7 773
Other wooded land	41 779
Forest, other wooded land and other land with tree cover	**397 262**
Forest type (forest land)	
Broadleaf	11%
Coniferous	67%
Mixedwood	16%
Non-treed	6%
National parks area (million hectares)	37.3

TRADE	
Balance of trade (total exports) (dollars) (2011)	17 230 159 353
Value of domestic exports (dollars) (2011)	**26 256 460 435**
Primary wood products	1 081 860 052
Pulp and paper products	17 209 392 265
Wood-fabricated materials	7 965 208 118
Value of imports (dollars) (2011)	**9 168 618 874**
Primary wood products	397 953 817
Pulp and paper products	6 184 252 760
Wood-fabricated materials	2 586 412 297

See page 18 for background information and sources for the statistics presented in these tables.

BRITISH COLUMBIA

Population (April 1, 2012) · 4 597 919	Western redcedar
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	26 367
Direct jobs (number) (2011)	
Labour Force Survey	53 300
Survey of Employment, Payrolls and Hours	46 220
Expenditures — capital (dollars) (2011)	**602 400 000**
Forestry and logging industry	61 300 000
Pulp and paper product manufacturing industry	243 200 000
Wood product manufacturing industry	297 900 000
Revenue from goods manufactured (dollars) (2010)	**14 697 350 000**
Forestry and logging industry	3 295 388 000
Pulp and paper product manufacturing industry	4 757 508 000
Wood product manufacturing industry	6 644 454 000
Wages and salaries (dollars) (2010)	**2 336 307 000**
Forestry and logging industry	542 673 000
Pulp and paper product manufacturing industry	603 885 000
Wood product manufacturing industry	1 189 749 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	10 844 787
Area planted (hectares) (2010)	137 105
Area seeded (hectares) (2010)	Not available
Fire — area burned (hectares) (2011)	12 357
Fires — number (2011)	646
Forest area certified (hectares) (2011)	53 523 866
Harvest area (hectares) (2010)	168 027
Harvest volume (cubic metres) (2011)	69 204 000
INVENTORY	
Provincial parks area (million hectares)	13.5
TRADE	
Balance of trade (total exports) (dollars) (2011)	8 425 573 162
Value of domestic exports (dollars) (2011)	**9 866 993 812**
Primary wood products	886 967 419
Pulp and paper products	4 278 918 408
Wood-fabricated materials	4 701 107 985
Value of imports (dollars) (2011)	**1 416 354 063**
Primary wood products	51 652 273
Pulp and paper products	683 802 328
Wood-fabricated materials	680 899 462

ALBERTA

Population (April 1, 2012) · 3 817 980	Lodgepole pine
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	25 483
Direct jobs (number) (2011)	
Labour Force Survey	21 400
Survey of Employment, Payrolls and Hours	16 661
Expenditures — capital (dollars) (2011)	**197 000 000**
Forestry and logging industry	39 800 000
Pulp and paper product manufacturing industry	92 400 000
Wood product manufacturing industry	64 800 000
Revenue from goods manufactured (dollars) (2010)	**4 929 861 000**
Forestry and logging industry	731 829 000
Pulp and paper product manufacturing industry	1 926 819 000
Wood product manufacturing industry	2 271 213 000
Wages and salaries (dollars) (2010)	**801 321 000**
Forestry and logging industry	116 310 000
Pulp and paper product manufacturing industry	203 063 000
Wood product manufacturing industry	481 948 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	334 916
Area planted (hectares) (2010)	55 229
Area seeded (hectares) (2010)	987
Fire — area burned (hectares) (2011)	940 596
Fires — number (2011)	1 097
Forest area certified (hectares) (2011)	19 519 237
Harvest area (hectares) (2010)	78 640
Harvest volume (cubic metres) (2010)	21 026 000
INVENTORY	
Provincial parks area (thousand hectares)	221
TRADE	
Balance of trade (total exports) (dollars) (2011)	1 725 041 118
Value of domestic exports (dollars) (2011)	**2 022 200 947**
Primary wood products	20 798 041
Pulp and paper products	1 523 420 549
Wood-fabricated materials	477 982 357
Value of imports (dollars) (2011)	**329 431 183**
Primary wood products	5 271 313
Pulp and paper products	148 390 395
Wood-fabricated materials	175 769 475

SASKATCHEWAN

Population (April 1, 2012) · 1 067 612	White birch
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	7 183
Direct jobs (number) (2011)	
Labour Force Survey	3 300
Survey of Employment, Payrolls and Hours	Not available
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	1 800 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	42 531 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	216 750 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	12 526 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	55 766 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	11 066
Area planted (hectares) (2010)	1 915
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	343 720
Fires – number (2011)	303
Forest area certified (hectares) (2011)	3 939 161
Harvest area (hectares) (2010)	9 694
Harvest volume (cubic metres) (2010)	1 919 000
INVENTORY	
Provincial parks area (million hectares)	1.1
TRADE	
Balance of trade (total exports) (dollars) (2011)	188 043 945
Value of domestic exports (dollars) (2011)	**273 037 574**
Primary wood products	2 308 554
Pulp and paper products	201 999 969
Wood-fabricated materials	68 729 051
Value of imports (dollars) (2011)	**85 450 058**
Primary wood products	2 279 125
Pulp and paper products	38 918 920
Wood-fabricated materials	44 252 013

MANITOBA

Population (April 1, 2012) · 1 258 260	White spruce
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	5 908
Direct jobs (number) (2011)	
Labour Force Survey	5 700
Survey of Employment, Payrolls and Hours	Not available
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	1 300 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	44 791 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	365 425 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	7 959 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	82 263 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	140 055
Area planted (hectares) (2010)	6 367
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	126 844
Fires – number (2011)	315
Forest area certified (hectares) (2011)	10 589 085
Harvest area (hectares) (2010)	Not available
Harvest volume (cubic metres) (2010)	1 275 000
INVENTORY	
Provincial parks area (million hectares)	4.2
TRADE	
Balance of trade (total exports) (dollars) (2011)	-66 731 909
Value of domestic exports (dollars) (2011)	**317 475 757**
Primary wood products	1 018 637
Pulp and paper products	230 892 840
Wood-fabricated materials	85 564 280
Value of imports (dollars) (2011)	**384 353 764**
Primary wood products	2 561 523
Pulp and paper products	272 742 758
Wood-fabricated materials	109 049 483

ONTARIO Population (April 1, 2012) · 13 445 408	Eastern white pine
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	67 742
Direct jobs (number) (2011)	
Labour Force Survey	53 500
Survey of Employment, Payrolls and Hours	39 935
Expenditures – capital (dollars) (2011)	**365 800 000**
Forestry and logging industry	28 900 000
Pulp and paper product manufacturing industry	209 800 000
Wood product manufacturing industry	127 100 000
Revenue from goods manufactured (dollars) (2010)	**11 118 534 000**
Forestry and logging industry	976 018 000
Pulp and paper product manufacturing industry	7 030 800 000
Wood product manufacturing industry	3 111 716 000
Wages and salaries (dollars) (2010)	**2 013 212 000**
Forestry and logging industry	157 916 000
Pulp and paper product manufacturing industry	1 173 680 000
Wood product manufacturing industry	681 616 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	562 225
Area planted (hectares) (2010)	40 858
Area seeded (hectares) (2010)	9 733
Fire – area burned (hectares) (2011)	635 373
Fires – number (2011)	1 334
Forest area certified (hectares) (2011)	23 423 757
Harvest area (hectares) (2010)	100 100
Harvest volume (cubic metres) (2010)	12 951 000
INVENTORY	
Provincial parks area (million hectares)	8.2
TRADE	
Balance of trade (total exports) (dollars) (2011)	-709 886 065
Value of domestic exports (dollars) (2011)	**4 092 938 340**
Primary wood products	50 980 505
Pulp and paper products	3 346 977 436
Wood-fabricated materials	694 980 399
Value of imports (dollars) (2011)	**4 924 681 103**
Primary wood products	49 883 198
Pulp and paper products	3 819 506 093
Wood-fabricated materials	1 055 291 812

QUEBEC Population (April 1, 2012) · 8 013 073	Yellow birch
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	48 217
Direct jobs (number) (2011)	
Labour Force Survey	75 000
Survey of Employment, Payrolls and Hours	62 756
Expenditures – capital (dollars) (2011)	**669 800 000**
Forestry and logging industry	60 300 000
Pulp and paper product manufacturing industry	311 900 000
Wood product manufacturing industry	297 600 000
Revenue from goods manufactured (dollars) (2010)	**16 671 379 000**
Forestry and logging industry	1 940 916 000
Pulp and paper product manufacturing industry	8 608 502 000
Wood product manufacturing industry	6 121 961 000
Wages and salaries (dollars) (2010)	**2 691 929 000**
Forestry and logging industry	383 003 000
Pulp and paper product manufacturing industry	1 207 314 000
Wood product manufacturing industry	1 101 612 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2011)	1 057 677
Area planted (hectares) (2010)	115 069
Area seeded (hectares) (2010)	356
Fire – area burned (hectares) (2011)	12 726
Fires – number (2011)	329
Forest area certified (hectares) (2011)	32 339 469
Harvest area (hectares) (2010)	193 188
Harvest volume (cubic metres) (2011)	17 509 000
INVENTORY	
Provincial parks area (thousand hectares) (excluding wildlife reserves)	755
TRADE	
Balance of trade (total exports) (dollars) (2011)	5 532 659 093
Value of domestic exports (dollars) (2011)	**7 277 703 096**
Primary wood products	65 744 080
Pulp and paper products	5 704 273 025
Wood-fabricated materials	1 507 685 991
Value of imports (dollars) (2011)	**1 757 727 732**
Primary wood products	219 177 923
Pulp and paper products	1 097 130 979
Wood-fabricated materials	441 418 830

NEW BRUNSWICK

Population (April 1, 2012) - 756 030	Balsam fir
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	3 233
Direct jobs (number) (2011)	
Labour Force Survey	12 700
Survey of Employment, Payrolls and Hours	9 553
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	9 600 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	519 181 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	909 056 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	84 343 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	165 433 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	49 635
Area planted (hectares) (2010)	19 579
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	45
Fires – number (2011)	81
Forest area certified (hectares) (2011)	3 885 486
Harvest area (hectares) (2010)	71 483
Harvest volume (cubic metres) (2010)	9 219 000
INVENTORY	
Provincial parks area (thousand hectares)	3.8
TRADE	
Balance of trade (total exports) (dollars) (2011)	1 303 115 673
Value of domestic exports (dollars) (2011)	**1 518 465 232**
Primary wood products	28 076 178
Pulp and paper products	1 145 628 558
Wood-fabricated materials	344 760 496
Value of imports (dollars) (2011)	**214 939 318**
Primary wood products	67 108 329
Pulp and paper products	101 079 516
Wood-fabricated materials	46 751 473

NOVA SCOTIA

Population (April 1, 2012) - 945 532	Red spruce
DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	4 667
Direct jobs (number) (2011)	
Labour Force Survey	6 400
Survey of Employment, Payrolls and Hours	Not available
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	Not available
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	156 444 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	540 850 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	34 643 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	99 623 000
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	Not available
Area planted (hectares) (2010)	8 292
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	136
Fires – number (2011)	116
Forest area certified (hectares) (2011)	1 284 952
Harvest area (hectares) (2010)	40 954
Harvest volume (cubic metres) (2010)	4 482 000
INVENTORY	
Provincial parks area (thousand hectares)	31
TRADE	
Balance of trade (total exports) (dollars) (2011)	675 532 751
Value of domestic exports (dollars) (2011)	**725 361 695**
Primary wood products	25 828 827
Pulp and paper products	619 208 305
Wood-fabricated materials	80 324 563
Value of imports (dollars) (2011)	**50 210 281**
Primary wood products	0
Pulp and paper products	17 511 721
Wood-fabricated materials	32 698 560

PRINCE EDWARD ISLAND

Red oak

Population (April 1, 2012) · 145 883

DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	975
Direct jobs (number) (2011)	
Labour Force Survey	500
Survey of Employment, Payrolls and Hours	Not available
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	200 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	Not available
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	17 111 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	Not available
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	3 445 000

FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	Not available
Area planted (hectares) (2010)	283
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	6
Fires – number (2011)	4
Forest area certified (hectares) (2011)	337
Harvest area (hectares) (2010)	8 249
Harvest volume (cubic metres) (2010)	388 000

INVENTORY	
Provincial parks area (thousand hectares)	2

TRADE	
Balance of trade (total exports) (dollars) (2011)	1 900 502
Value of domestic exports (dollars) (2011)	**1 895 190**
Primary wood products	87 028
Pulp and paper products	1 668 574
Wood-fabricated materials	139 588
Value of imports (dollars) (2011)	**27 905**
Primary wood products	0
Pulp and paper products	9 731
Wood-fabricated materials	18 174

NEWFOUNDLAND AND LABRADOR

Black spruce

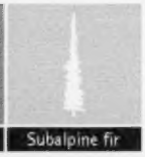
Population (April 1, 2012) · 511 036

DOMESTIC ECONOMIC IMPACT	
Housing starts (2011)	3 483
Direct jobs (number) (2011)	
Labour Force Survey	2 000
Survey of Employment, Payrolls and Hours	Not available
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	200 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Revenue from goods manufactured (dollars) (2010)	**Not available**
Forestry and logging industry	54 763 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	58 979 000
Wages and salaries (dollars) (2010)	**Not available**
Forestry and logging industry	14 917 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	13 376 000

FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	99 772
Area planted (hectares) (2010)	5 526
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	594
Fires – number (2011)	53
Forest area certified (hectares) (2011)	2 061 674
Harvest area (hectares) (2010)	16 977
Harvest volume (cubic metres) (2010)	1 501 000

INVENTORY	
Provincial parks area (thousand hectares)	35

TRADE	
Balance of trade (total exports) (dollars) (2011)	154 360 315
Value of domestic exports (dollars) (2011)	**159 736 565**
Primary wood products	11 642
Pulp and paper products	156 351 882
Wood-fabricated materials	3 373 041
Value of imports (dollars) (2011)	**5 397 303**
Primary wood products	20 081
Pulp and paper products	5 147 599
Wood-fabricated materials	229 623



YUKON

Population (April 1, 2012) - 34 886

Subalpine fir

FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	55 105
Area planted (hectares) (2010)	35
Area seeded (hectares) (2010)	35
Fire – area burned (hectares) (2011)	39 091
Fires – number (2011)	56
Forest area certified (hectares) (2011)	Not available
Harvest area (hectares) (2010)	300
Harvest volume (cubic metres) (2010)	27 000
INVENTORY	
Territorial parks area (thousand hectares)	933
TRADE	
Balance of trade (total exports) (dollars) (2011)	384 475
Value of domestic exports (dollars) (2011)	**425 638**
Primary wood products	12 951
Pulp and paper products	0
Wood-fabricated materials	412 687
Value of imports (dollars) (2011)	**41 163**
Primary wood products	0
Pulp and paper products	8 006
Wood-fabricated materials	33 157

NORTHWEST TERRITORIES

Population (April 1, 2012) - 43 346

Tamarack

DOMESTIC ECONOMIC IMPACT	
Expenditures – capital (dollars) (2011)	**Not available**
Forestry and logging industry	200 000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
FOREST MANAGEMENT	
Area defoliated by insects and beetle-killed trees (hectares) (2010)	56 205
Area planted (hectares) (2010)	27
Area seeded (hectares) (2010)	Not available
Fire – area burned (hectares) (2011)	406 693
Fires – number (2011)	207
Forest area certified (hectares) (2011)	Not available
Harvest area (hectares) (2010)	60
Harvest volume (cubic metres) (2010)	24 000
INVENTORY	
Territorial parks area (thousand hectares)	13
TRADE	
Balance of trade (total exports) (dollars) (2011)	125 658
Value of domestic exports (dollars) (2011)	**129 989**
Primary wood products	0
Pulp and paper products	47 208
Wood-fabricated materials	82 781
Value of imports (dollars) (2011)	**4 331**
Primary wood products	0
Pulp and paper products	4 331
Wood-fabricated materials	0

NUNAVUT

Population (April 1, 2012) - 33 387

TRADE	
Balance of trade (total exports) (dollars) (2011)	68 540
Value of domestic exports (dollars) (2011)	**69 210**
Primary wood products	26 190
Pulp and paper products	5 511
Wood-fabricated materials	37 509
Value of imports (dollars) (2011)	**670**
Primary wood products	52
Pulp and paper products	383
Wood-fabricated materials	235

SOURCE AND INFORMATION

The statistical profile data in the preceding tables are derived from a number of sources, which are identified here under each data type. Where necessary, they have been edited for accuracy and consistency. All data are subject to revision.

In most cases, the data represent the year before the reporting period. However, when they are gathered from several sources, it takes longer to analyze and produce them. In these cases, the numbers reflect results from two or three years before the reporting period.

While most of the figures are calculated for the calendar year, some are based on the federal government's fiscal year (April 1 to March 31). Numbers are rounded off. In the case of employment data, they are rounded to the nearest hundred.

It may not be possible to compare directly the data from the various sections, as they come from several sources that may compile their statistics differently from each other.

ARBOREAL EMBLEM

The tree species designated or officially adopted as the arboreal emblem of Canada and of each province and territory is shown in the profiles. Nunavut does not have an arboreal emblem.

Domestic economic impact

CANADIAN HOUSING STARTS – SEASONALLY ADJUSTED ANNUAL RATE (SAAR)

A rate adjustment used for economic or business data that attempts to remove seasonal variations in the data.

The time of year will affect most data. Adjusting for the seasonality in data enables more accurate month-to-month comparisons. The SAAR is calculated by dividing the unadjusted annual rate for the month by its seasonality factor and creating an adjusted annual rate for the month. These adjustments are more often used when economic data are released to the public.

Source: Canada Mortgage and Housing Corporation

CONTRIBUTION TO GROSS DOMESTIC PRODUCT (GDP)

The total unduplicated value of the goods and services produced in an economic area such as a country or region during a given period. ("Unduplicated value" means that the intermediate costs of producing an item or service have been deducted.) Figures are in constant dollars and available only for Canada. The constant dollars are used to measure variations in the dollar's real value over time. The constant dollar is the real value of a current dollar compared with a dollar's value in a specific reference year. Expressing GDP in constant dollars makes it possible to measure real growth by removing the effect of inflation.

Source: Statistics Canada, gross domestic product at basic prices, by North American Industry Classification System, monthly (dollars), CANSIM Table 379-0027, March 2012, and selected economic indicators, provincial economic accounts, annual, CANSIM Table 384-0013, April 2012

DIRECT JOBS

Jobs held by people employed directly in the following industries: forestry and logging, industries involved in support activities for forestry, pulp and paper product manufacturing and wood product manufacturing.

The data are sourced from Statistics Canada's Labour Force Survey (LFS) and the Survey of Employment, Payrolls and Hours (SEPH). The LFS data are used to capture the level of self-employment in the forest sector. The SEPH data are to be used for comparing direct employment in forestry with that in other sectors.

Source: Statistics Canada, Labour Force Survey, March 2012 (special extraction) and the Survey of Employment, Payrolls and Hours, unadjusted for seasonal variation, by type of employee for selected industries classified using the North American Industry Classification System, monthly (persons), CANSIM Table 281-0023, March 2012

EXPENDITURES – CAPITAL AND REPAIR

Capital expenditures: Include the cost of procuring, constructing and installing or leasing new durable plants, machinery and equipment, whether for the replacement of, or addition to, existing assets. Also included are: all capitalized costs such as the costs for feasibility studies and architectural, legal, installation and engineering fees; the value of capital assets put in place by firms either by contract or with the firm's own labour force; and capitalized interest charges on loans for capital projects.

Repair expenditures: Include costs to repair and maintain structures, machinery and equipment.

Source: Statistics Canada, capital and repair expenditures, by sector and province, annual (dollars), CANSIM Table 029-0005, and capital and repair expenditures, industry sectors 31-33, manufacturing, annual (dollars), CANSIM Table 029-0009, March 2012

REVENUE FROM GOODS MANUFACTURED

Revenue from the sale of goods manufactured using materials owned by the establishment, as well as from repair work, manufacturing service charges and work contracted to others.

Source: Statistics Canada, Annual Survey of Manufactures and Logging: logging industries, principal statistics by North American Industry Classification System, annual, CANSIM Table 301-0007, and principal statistics for manufacturing industries, by North American Industry Classification System, annual, CANSIM Table 301-0006

WAGES AND SALARIES

The earnings, in cash or in kind, of Canadian residents for work performed before deduction of income taxes and contributions to pension funds, employment insurance and other social insurance schemes.

Source: Statistics Canada, Annual Survey of Manufactures and Logging: logging industries, principal statistics by North American Industry Classification System, annual, CANSIM Table 301-0007, and principal statistics for manufacturing industries, by North American Industry Classification System, annual, CANSIM Table 301-0006

Forest management

AREA DEFOLIATED BY INSECTS AND BEETLE-KILLED TREES

Areas where there is tree mortality and moderate to severe defoliation.

Defoliation does not always imply mortality. For example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one species at a time. This may result in double or triple counting in areas affected by more than one species, exaggerating the extent of the total area defoliated.

Source: National Forestry Database

AREA PLANTED AND SEEDED

Total of federal, private and provincial Crown land.

Source: National Forestry Database

CARBON EMISSIONS/REMOVALS

For forest lands affected by land-use change, the deforestation and afforestation figures reflect annual rates. Figures for CO_2-equivalent (CO_2e) emissions and removals reflect the current year plus the previous 20 years. Thus, the figures for CO_2e emissions include residual emissions from areas deforested over the past 20 years; and the figures for CO_2e removals include ongoing removals by areas afforested over the past 20 years.

Emissions and removals exactly match the most recent greenhouse gas inventory figures submitted to the United Nations Framework Convention on Climate Change. Emissions always bear a positive sign. Removals bear a negative sign.

Source: National Inventory Report 2012, Environment Canada (based on Natural Resources Canada–Canadian Forest Service data/analysis)

FIRE

All burned areas within Canada's forests.

Sources: All figures for the most current year are from the Canadian Interagency Forest Fire Centre. Data for all previous years were provided by the provinces and territories and are available from the National Forestry Database

FOREST AREA CERTIFIED

If a forest area has been certified to more than one of the three sustainable forest management standards (Canadian Standards Association [CSA], Sustainable Forestry Initiative [SFI] and Forest Stewardship Council [FSC]), the area is counted only once. Hence, the total certifications for sustainable forest management standards may be less than the sum of the individual totals for these standards.

Source: Canadian Sustainable Forestry Certification Coalition

HARVEST (VOLUME)

The national and provincial/territorial figures for harvesting volume include data for industrial roundwood, fuelwood and firewood.

Source: National Forestry Database

Forest products

DOMESTIC CONSUMPTION

Consumption figures for a range of products, calculated by Natural Resources Canada–Canadian Forest Service.

This information is available only at the national level.

PRODUCTION

Christmas trees
The production quantity and value are based on estimates calculated by Natural Resources Canada–Canadian Forest Service.

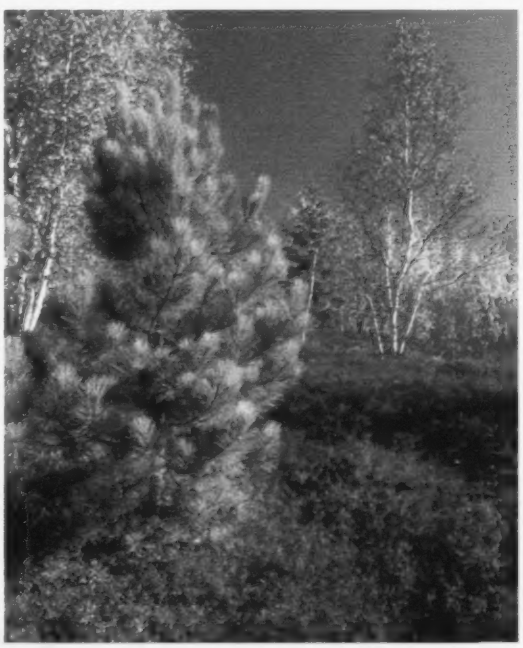
Sources: Statistics Canada and National Forestry Database

Lumber
Source: Statistics Canada, sawn lumber production and shipments, monthly (cubic metres dry), CANSIM Table 303-0009, April 2012

Maple products
Source: National Forestry Database

Newsprint, printing and writing paper, wood pulp
The production and consumption figures are based on Pulp and Paper Products Council data.

Structural panels
The production and consumption data of structural panels (plywood and oriented strandboard) are from the APA–The Engineered Wood Association.



Inventory

AREA CLASSIFICATION

Source: National Forest Inventory 2006

Forest type
Source: National Forest Inventory 2006

The National Forest Inventory uses the following Food and Agriculture Organization of the United Nations (FAO) definitions:

Forest land
Areas of land where tree canopies cover more than 10% of the total area and the trees, when mature, can grow to a height of more than 5 metres. Does not include land that is predominantly urban or used for agricultural purposes.

Other land with tree cover
Areas of land where tree canopies cover more than 10% of the total area and the trees, when mature, can grow to a height of at least 5 metres. Includes treed areas on farms, in parks and gardens, and around buildings. Also includes tree plantations established mainly for purposes other than wood production, such as fruit orchards.

Other wooded land
Areas of land where: 1) tree canopies cover 5–10% of the total area and the trees, when mature, can grow to a height above 5 metres; or 2) shrubs, bushes and trees together cover more than 10% of the area. These areas include treed wetlands (swamps) and land with slow-growing and scattered trees. They do not include land that is predominantly agricultural or urban.

Trade

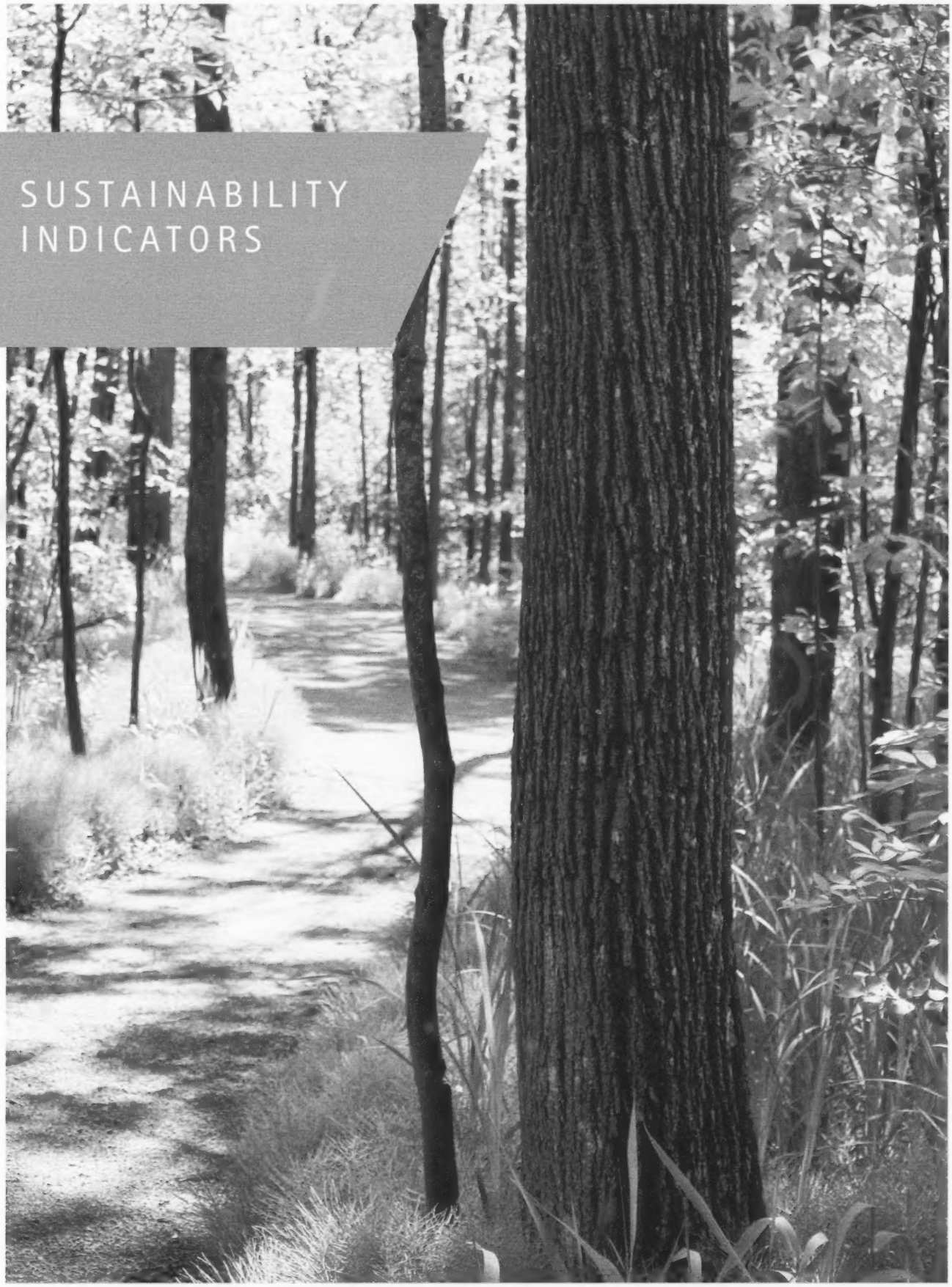
BALANCE OF TRADE

The difference between the value of the goods and services that a country exports and the value of the goods and services that it imports.

If a country's exports exceed its imports, it has a trade surplus. If imports exceed exports, the country has a trade deficit.

Source: Statistics Canada, merchandise trade data (special extraction), monthly data

SUSTAINABILITY INDICATORS



Most Canadians understand that managing our forests responsibly and sustainably requires finding a balance between the preservation of environmental quality, the enhancement of economic wealth and opportunity, and the development of social benefits.

Sustainable forest management works to address and balance this range of values so that the needs and expectations of all forest users might be met today and in the future. Canadians expect their governments to be responsible stewards of their forest resource, and increasingly our overseas markets expect forest products to come from sustainably managed sources.

But how can we determine our effectiveness in achieving that management balancing act? How can we monitor our progress in ensuring the country's forests are managed sustainably? The answer lies in the use of indicators, objective measures for which data can be collected and tracked over time.

Sustainability indicators are practical, science-based measures that give government, industry, researchers and the public a consistent way to define, assess, monitor and report progress in achieving sustainable forest management. Sustainability indicators can also be used to identify where improvements in forest management can be made.

At the national level, Canada uses a set of 46 indicators that represent the full range of forest values Canadians want conserved or sustained. These values are biological diversity, ecosystem condition and productivity, soil and water, global ecological cycles, economic and social benefits, and social responsibility. Since sustainability requires a balance among environmental, economic and social values, no single indicator can be used to assess sustainable forest management. For a clear picture, the whole range of indicators must be considered.

The following sample of 13 indicators (addressing five of the six forest values), along with the most recent data for them, shows how the information collected for each measure contributes to our assessment and understanding of Canada's progress in sustainable forest management. For the complete list of indicators, go to cfs.nrcan.gc.ca.

BIOLOGICAL DIVERSITY

Biological diversity (commonly shortened to "biodiversity") refers to the variety of species and ecosystems on Earth and the ecological processes they are part of.

This complex, closely interconnected web of diversity is what enables organisms and ecosystems to respond and adapt to environmental change. Conserving biodiversity is therefore crucial to maintaining the long-term health of Canada's forests and ensuring they remain sustainably productive.

Status of forest-associated species at risk

WHY IS THIS INDICATOR IMPORTANT?

Change over time in the conservation status of forest-associated species of flora and fauna is one indicator used to evaluate the sustainability of forest management practices in Canada. Forest-associated species require forest habitat to complete their lifecycle.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) meets annually to assess the conservation status of species thought to be at some degree of risk.

WHAT HAS CHANGED?

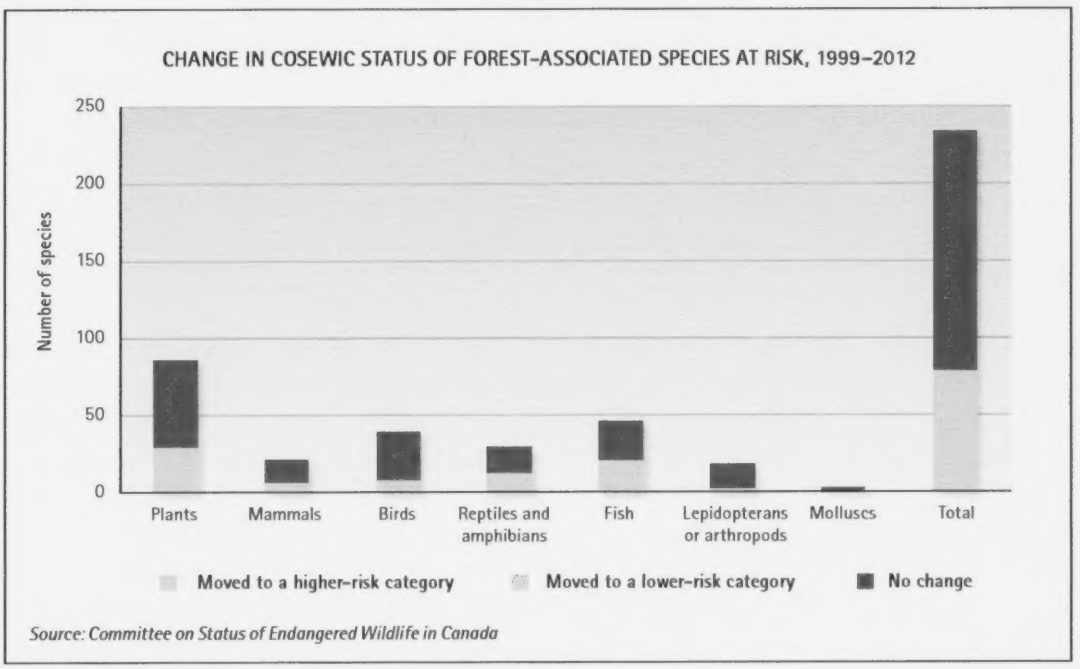
Currently, 349 COSEWIC-listed forest-associated species are at risk in Canada.

In May 2012, COSEWIC reassessed or newly assessed 39 species at risk. Twenty-one of those are forest-associated species.

- Two were added to the list since the previous assessment: the western grizzly bear and the magnum mantleslug, both identified as species of Special Concern.
- Of the 19 that were reassessed, 10 had no change in their risk level, 7 were moved to a higher-risk category, 1 was moved to a lower-risk category, and 1 was removed from the list (no longer considered to be a species at risk).

COSEWIC has listed habitat loss and degradation as the main threat to Canadian wildlife. Other threats listed include climate change, pollution and overharvesting (e.g., hunting and fishing). In the case of the grizzly bear, however, human-caused mortality combined with habitat loss has reduced the bear's range by more than 50% over the past century. In the southern part of the animal's range, where the bears are in regular contact with humans, many populations are declining. In the north, the impacts on bears of ongoing and escalating extraction of natural resources is a concern.

The graph below shows the change in COSEWIC status of 234 forest-associated species at risk between 1999 and 2012. Not included in the graph are the 115 species that have been assessed only once so far (and therefore have exhibited no known change in status) or for which data are insufficient to estimate status.



Source: Committee on Status of Endangered Wildlife in Canada

ECOSYSTEM CONDITION AND PRODUCTIVITY

Canada's forest ecosystems must be resilient so they can cope with, and recover from, natural disturbances such as wildfire and insect infestations, and human disturbances such as timber harvesting.

Understanding where these disturbances occur, how extensive they are and what impact they have on ecological functions and processes is necessary if a sustainable flow of benefits from the forest land base is to be maintained.

Additions and deletions of forest area

WHY IS THIS INDICATOR IMPORTANT?

Knowing how and why forest areas change over time is important for managing forests sustainably because such changes may result in long-term deletions (e.g., deforestation) from Canada's forest land base or additions (e.g., afforestation).

- *Deforestation* means the long-term conversion of forest to other land uses. In Canada, deforestation is mainly the result of forest land being converted to use for agriculture, industrial development, resource extraction and urban expansion. Harvesting, when followed by regeneration, is not deforestation.
- *Afforestation* means the establishment of new forests on previously unforested land.

Because forests provide a number of ecological services, such as water purification and erosion control, additions and deletions of forest area affect soil and water conservation as well as the overall capacity of forests to recover from natural and human disturbances. Forests also act as sinks and sources of carbon, so monitoring forest additions and deletions help scientists gauge Canada's ability to meet its climate change related commitments.

WHAT HAS CHANGED?

Over the last two decades in Canada, the annual rate of deforestation has declined, dropping from just over 64 000 hectares in 1990 to about 45 000 hectares in 2010. Spikes in this downward trend have occurred for short periods, however, when forested areas have been submerged by water reservoirs associated with large hydroelectric projects. For example, 35 000 hectares of forest area were lost in the mid-1990s and another 28 000 hectares were lost in the mid-2000s because of the development of reservoirs.

In 2010, deforestation resulted in net emissions of 15.7 million tonnes of carbon dioxide equivalent, down from 27.5 million tonnes in 1990. (These numbers account for lateral transfers of carbon from the forest ecosystem to the forest product sector, in the form of [1] greenhouse gas emissions to the atmosphere and [2] residual emissions from deforestation in previous years.)

Limited afforestation has been carried out in Canada since 1990 relative to the total area of forested land. Although millions of trees are planted each year to supplement natural regeneration, these efforts are occurring primarily as part of sustainable forest management in areas that were already forested. Urban and rural planting initiatives are underway in many regions, including Quebec, Ontario and the Prairie provinces.

ESTIMATED AREA (HECTARES) OF DEFORESTATION IN CANADA, BY INDUSTRIAL SECTOR, 1990–2010					
	Year				
Sector	1990	1995	2000	2005	2010
Agriculture	41 900	22 400	20 500	19 100	19 100
Forestry[a]	4 100	4 400	4 500	4 500	4 500
Hydroelectric infrastructure[b]	2 600	1 500	900	1 000	700
Industry and transportation[c]					
Industry	900	800	800	800	800
Mining	2 300	2 500	2 500	2 500	2 400
Oil and gas	5 300	5 900	8 900	10 600	10 600
Transportation	1 700	1 500	1 400	1 300	1 300
Municipal[d]	3 900	3 700	4 200	4 600	4 600
Peat mining	900	700	500	0	0
Recreation[e]	800	900	800	700	700
Total[f]	**64 400**	**44 200**	**45 000**	**45 200**	**44 800**

[a] *Resulting from the creation of permanent forest access roads.*
[b] *Excludes reservoirs.*
[c] *Includes mines, gravel pits, oil and gas projects and highway construction.*
[d] *Includes urban development.*
[e] *Includes ski hills and golf courses.*
[f] *Totals adjusted for rounding.*

Source: Environment Canada, 2012

Area of forest disturbed by fire, insects, disease and harvesting

WHY IS THIS INDICATOR IMPORTANT?

Forests are constantly exposed to and modified by natural disturbances such as fire, insects and diseases. Natural disturbances are an essential part of the process of forest renewal.

As well, forests are disturbed by industrial activities such as logging, road construction, oil and gas ventures and other human activities.

Foresters study both natural and human disturbances to gain a better understanding of how forest ecosystems change. They also look increasingly to natural events for insights into planning forest harvesting, working to ensure that their practices facilitate natural regeneration and recovery of ecosystem productivity following harvest.

WHAT HAS CHANGED?

Fires

In 2011, 4608 forest fires were reported across Canada, approximately two-thirds of the previous 10-year average (2001–2010). The area burned in 2011 (2.6 million hectares) was also 15% lower than the 10-year average.

The 2010 fire season was exceptionally severe, with twice the average annual area burned. Above-average dry conditions continued into the fall, with the drought code (a national index reflecting the dryness of the deep forest layers) indicating extreme conditions throughout much of western Canada and the territories. However, under La Niña's influence, overwinter snowfall and precipitation were unusually high in much of Canada. As a result, spring arrived late in 2011 and drought conditions greatly lessened across the country, except in British Columbia, Alberta and the Yukon.

Still, despite it being a below-average year for fire activity, 2011 saw several examples of extreme fire behaviour. The most notable examples were in Alberta and Ontario.

- Strong, dry winds gusting up to 70 kilometres/hour, combined with a lack of precipitation, created severe conditions across most of northern Alberta during the May 14–15 weekend. These events led to the Slave Lake Fire, which burned into the community, destroying over 400 homes and causing $700 million in insurable losses; and the Richardson Fires, which grew to over 500 000 hectares in size, ultimately accounting for about 20% of the total area burned in Canada during 2011.
- During Ontario's 2011 fire season, 1334 fires burned 635 373 hectares—the most area in that province ever burned in one year (the 10-year average is 1109 fires burning 76 837 hectares). Most fires were triggered by lightning events as storms tracked north and south of the province. In July alone, 650 fires burned 558 000 hectares.

Insects

In 2010, about 12.7 million hectares of forest contained beetle-killed trees or were defoliated by other insects—a decrease from 15.2 million hectares the year before.

From 1998 to 2011, the mountain pine beetle killed more than 710 million cubic metres of pine in British Columbia, which represents more than 50% of the province's commercial pine inventory.

Since the mountain pine beetle invaded northern Alberta in 2001, about 1.3 million hectares of forest have been affected in that province. Alberta's efforts to control the beetle, along with weather unfavourable to the insect's survival, have significantly reduced beetle populations in southern and central Alberta. Still, their populations continue to increase and spread in northwestern Alberta and northeastern British Columbia, moving north towards the border with the Northwest Territories. Future north- and eastward expansion of the beetle will depend on a range of factors: its ability to survive the winter; its development during the summer; its interactions with native and new host trees; the distribution of susceptible host trees; and the effectiveness of control efforts.

Outbreaks by some insects are cyclical, with peak populations occurring periodically in particular regions of the country. For example, outbreaks of spruce budworm recur at approximately 35- to 40-year intervals in eastern Canada. The last extensive outbreak covered more than 50 million hectares in the 1970s and then declined to fewer than 1 million hectares in the late 1990s. Since that time, there has been resurgence and then decline of populations in different regions throughout the extensive range of spruce budworm in Canada.

Invasive pests are a particular concern for forest managers because of uncertainty about how new species might affect the existing ecosystem. For example, since it was first detected in Windsor, Ontario, in 2002, the emerald ash borer has killed millions of ash trees in parts of Ontario and Quebec. It continues to spread into new areas, having considerable economic and ecological impacts.

Diseases

As agents of disturbance in forest ecosystems, forest diseases (or pathogens) are major drivers of diversity, shaping forest structure and function. Pathogens also play a major role in decomposition and carbon cycling in Canada's forests.

Native forest pathogens have evolved to exist in equilibrium with natural forest communities. However, they can become very destructive when the natural equilibrium is altered by forest management activities, climate change, fire or insects.

Across Canada, for example, Armillaria root disease is known to affect 203 million hectares of forest currently, infecting almost all tree species with long-term persistence. Surveys of Douglas-fir in British Columbia and spruce and balsam fir in Ontario have shown that Armillaria infection increases steadily in those species with stand age, whether after planting in harvested stands or after disturbance in natural stands. Another example is Annosus root and butt rot, now infecting an increased number of forest stands and established in regions not previously exposed to the disease.

Several alien invasive forest pathogens are also prominent in Canadian forests, in some cases threatening the survival of certain tree species. For example, white pine blister rust has destroyed extensive stands of white pine since being introduced into Canada in the early 1900s. Another introduced pathogen, the European race of the fungus that is causing Scleroderris canker in the forests of Ontario, Quebec and New Brunswick, has now become a considerable problem in Newfoundland. There it has breached a quarantine zone on the Avalon Peninsula and is threatening the native red pine stands on the island.

Environment-related factors such as drought, air pollution, extreme temperatures and nutrient deficiencies can cause disease directly or predispose trees to damage by disease-causing organisms. For example, ongoing aspen dieback and decline in western Canada and northern Ontario has been attributed to the combined effects of insect defoliation, pathogens and thaw-freeze events.

Since 2009, milder and more humid spring weather has favoured the development of many foliar diseases in Quebec, such as brown-spot needle blight and needle cast of white pine, shoot and needle blight of balsam fir, and anthracnose of maple and oak. Similar phenomena have been observed in Ontario, where ink spot of aspen affected more than 1800 hectares of forest in northern Ontario in 2009; and in southern New Brunswick, where stands show red pine affected by Sirococcus shoot blight. These foliar diseases do not typically threaten the survival of affected trees, but can reduce plant growth.

Harvesting

Provincial and territorial regulations govern harvesting of Canada's forests.

By law, all harvested areas in Canada must be reforested. In addition, many forest management practices are designed to mimic natural disturbances such as fire. These approaches have the advantage of preserving the natural attributes of Canada's forests and their ability to adapt to change while also considering economic and social factors.

In 2010, approximately 688 000 hectares of forest were harvested on provincial/territorial, federal and private lands, accounting for roughly 0.18% of all forest and other wooded land in Canada.

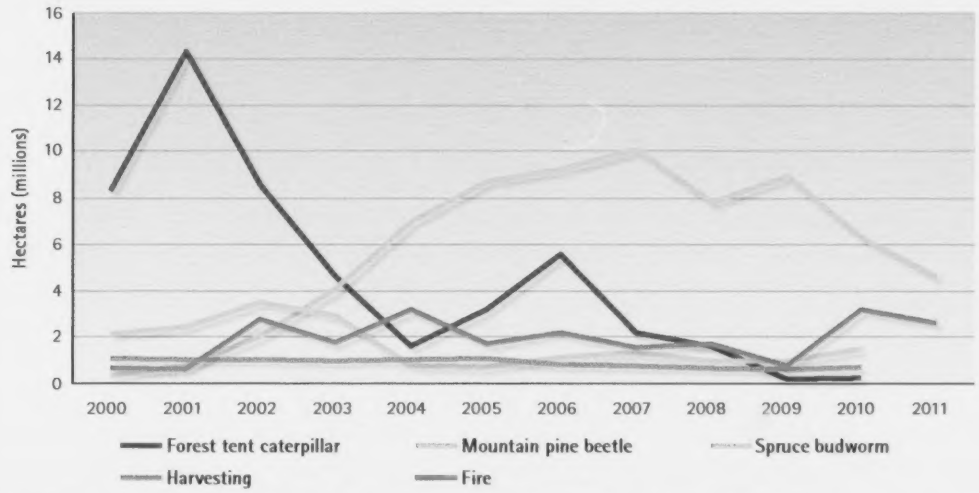
AREA OF FOREST DISTURBED IN CANADA, BY CAUSE, IN 2010 OR 2011
(Year for which the most recent data are available)

Cause of disturbance	Hectares (millions)	Percentage change from previous year
Area burned (2011)	2.6	-14.6
Area defoliated by major insects[a]		
Forest tent caterpillar (2010)	0.2	43.1
Mountain pine beetle (2011)	4.6	-26.4
Spruce budworm (2010)	1.5	53.2
Area affected by pathogens		
Armillaria root disease[b]	203.0	0.0
Area harvested (2010)	0.7	12.2

[a] *Area includes moderate to severe defoliation.*
[b] *Area affected remains constant year to year, but disease intensity changes.*

Source: Canadian Interagency Forest Fire Centre, National Forestry Database and British Columbia Ministry of Forests, Lands and Natural Resource Operations

AREA OF FOREST DISTURBED ANNUALLY BY FIRE, INSECTS (THREE SPECIES) AND HARVESTING, 2000–2011



Source: Canadian Interagency Forest Fire Centre, National Forestry Database and British Columbia Ministry of Forests, Lands and Natural Resource Operations

Proportion of timber harvest area regenerated by artificial and natural means

WHY IS THIS INDICATOR IMPORTANT?

Successful regeneration of harvest areas ensures that forest lands remain productive for wood fibre and continue to provide key ecosystem services such as storing carbon, regulating water quality and quantity, and providing recreation opportunities and wildlife habitat.

In Canada, provincial laws dictate that all harvested areas on provincial Crown lands must be successfully regenerated. Provinces set standards or have regulations to determine whether a harvest area has been successfully regenerated. These standards vary by province, but commonly incorporate such criteria as: species composition; density and distribution; age and height of the regenerating trees; and distribution of various forest types and age classes across the landscape. Harvested areas must meet provincial regeneration standards in a specified period of time.

Artificial regeneration (planting and seeding) increases the likelihood of achieving regeneration to planned future forest species compositions. It also provides the maximum control of density and stocking.

Natural regeneration can be effective when prescribed for certain conditions and for certain species, such as aspen or lowland spruce. The main benefit of natural regeneration is that it requires minimal human assistance and is therefore potentially less costly than artificial regeneration. However, natural regeneration offers less control over species composition, and remedial measures such as thinning or fill planting may be needed to regulate density and stocking to meet regeneration standards.

The proportion of area regenerated naturally and artificially can fluctuate as a result of several factors, including harvest level, changes in the type of forest harvested, and the amount of area affected by natural

disturbances such as fire, insect attack and wind. For example, the amount of burned area from which timber is salvaged can influence annual regeneration rates, since salvage areas may be better suited to natural or to artificial regeneration, depending on the site and original species composition.

Total area regenerated is often correlated with the area harvested, but reported regeneration rates typically lag about two years behind the year of actual disturbance.

WHAT HAS CHANGED?

Until the early 1950s, foresters managing even-aged forests relied almost exclusively on the natural regeneration of harvested areas. More recently, with improved techniques, better tools and evolving provincial regeneration standards, artificial and natural regeneration each account for approximately half of the total trust area regenerated annually in Canada.

Between 2009 and 2010, the area artificially regenerated increased by 1.8%.[1] Conversely, the total number of seedlings planted dropped by 1.0% to a 20-year low of 512 million. Relative to the 10-year average, artificial regeneration area and number of seedlings planted have declined by 10.3 and 13.4%, respectively. However, in 2010, the area of artificial regeneration increased for the first time since the steep decline (42%) in annual harvest area from a 10-year high in 2005 to a 20-year low in 2009.

The reduction in harvest levels began with the onset of a decline in the U.S. housing market and associated reduced demand for Canadian solid wood products. Reduced demand for pulp and paper products has also led to curtailed production in this sector, in turn impacting harvest levels.

The proportion of the area regenerated artificially versus naturally increased in 2010.[2] This proportion was estimated at 67.4% of the total harvest area in 2010. This deviation from the historical difference between artificial and natural regeneration may be related to the type of forest harvested. For example, lower demand for hardwood products would lead to fewer hardwood-dominated stands being harvested, and therefore less natural regeneration of these stands. Similarly, a shift in the conifer harvest from lowland to upland sites would necessitate more artificial regeneration.

Total area naturally regenerated is likely to continue to decline until there is a well-established recovery in harvest rates—which itself will rely on improved North American and international demand for Canadian forest products.

AREA HARVESTED AND REGENERATED IN CANADA, BY ARTIFICIAL AND NATURAL MEANS, BETWEEN 2008 AND 2010

	Area (hectares)	Percentage of 2008 harvested area[a]	Percentage change in area from previous year	Percentage change in area from 10-year average[b]
Harvest (2008)[a]	595 000		-14.0	-31.0
Regeneration method				
Natural[c]	219 000	36.8	-26.5	-47.2
Artificial	401 000	67.4	1.8	-10.3
Planting	390 000	65.5	3.2	-7.9
Seeding	11 000	1.8	-30.4	-53.3

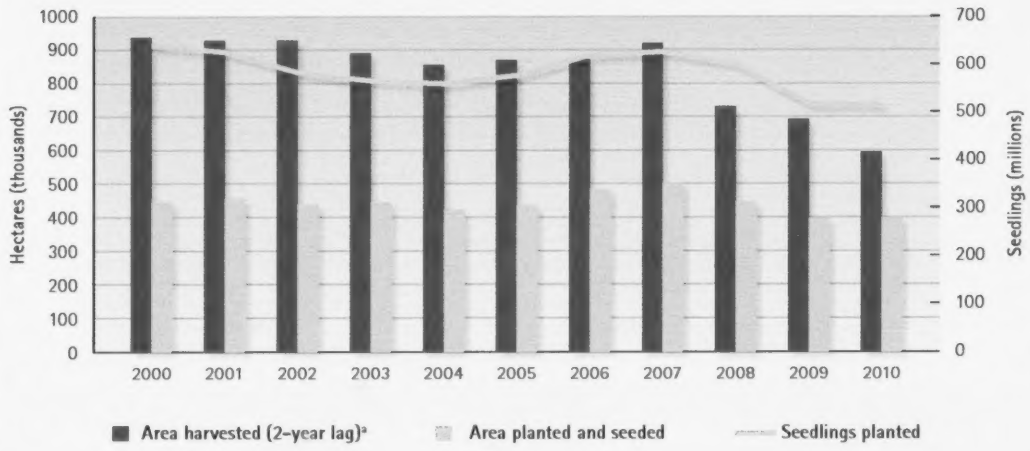
[a] *Assumes a two-year lag between harvest and regeneration. Harvest area data are from 2008. The portion of 2008 harvested area that is regenerated is calculated by dividing 2010 data by 2008 data.*
[b] *The 10-year average for harvest is for 1998–2007; and the 10-year average for natural and artificial regeneration area is for 2000–2009.*
[c] *Natural regeneration = 2008 harvest minus 2010 artificial regeneration.*

Source: National Forestry Database

1 Data are for even-aged forests on Crown lands across Canada. Federally and privately owned lands are excluded.

2 Because there is typically a delay of two years between harvest and regeneration to allow for site preparation and provision of nursery stock, regeneration data from 2010 are compared with harvest data from 2008.

FOREST REGENERATION ON PROVINCIAL CROWN LANDS ACROSS CANADA, 2000–2010



[a] *Because there is typically a delay of two years between harvest and regeneration to allow for site preparation and provision of nursery stock, regeneration data are compared with harvest data from two years before.*

Source: National Forestry Database

ROLE IN GLOBAL ECOLOGICAL CYCLES

Forests play an important role in supporting and maintaining global ecological cycles—cycles that are in turn critical to forests' sustainability.

Forests both depend on and contribute to the many and complex self-regulating processes that are responsible for recycling carbon, water, nitrogen and other life-sustaining elements. How forests are managed can affect their role in all of these cycles.

Carbon emissions/removals in Canada's managed forests

WHY IS THIS INDICATOR IMPORTANT?

Management activities aimed at increasing carbon stocks in Canada's forest ecosystems could help mitigate the effects of climate change.

Carbon emissions and removals from managed forests are an important indication of the contribution our forests make to the global carbon cycle and of the ever-changing impacts of natural processes. As well, monitoring trends in carbon emissions and removals is important for anticipating the future role of Canada's forests in the global carbon cycle, and for tracking the success of the forest sector's mitigation activities.

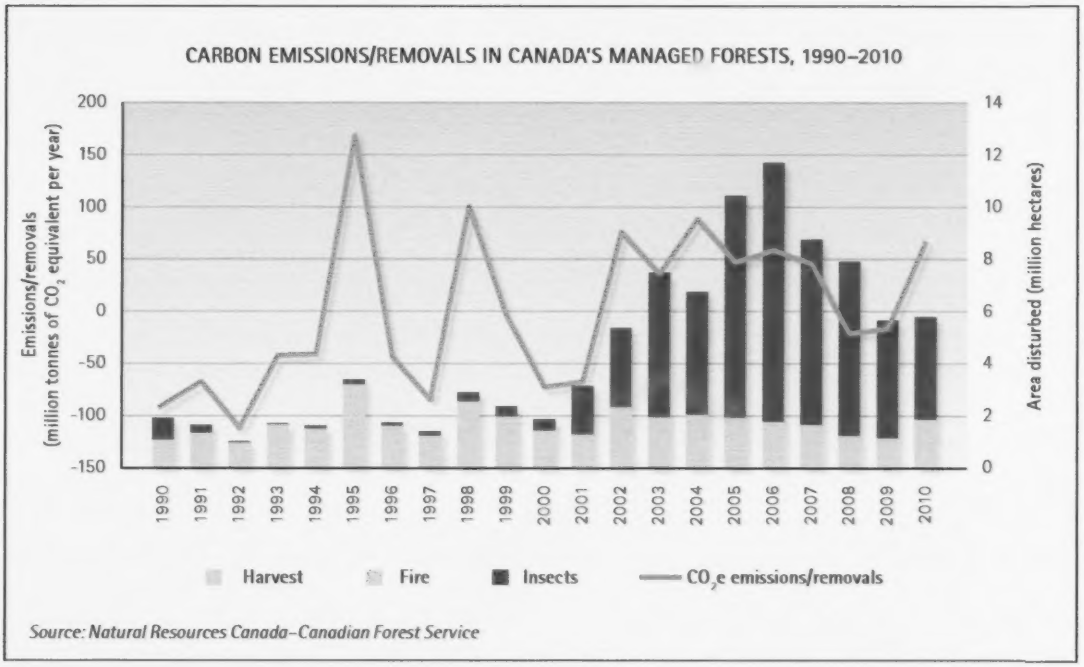
WHAT HAS CHANGED?

Canada's managed forests acted as net carbon sinks in 12 of the 21 years from 1990 to 2010. However, it is difficult to discern an overall trend because forest carbon emissions and removals vary considerably from year to year as a result of wildfires and (to a lesser extent) insect epidemics.

In 2010, the managed forests acted as a net carbon source, releasing 69 million tonnes of carbon dioxide equivalent (CO_2e) into the atmosphere. At the same time, however, these forests accumulated 60 million tonnes of carbon (or 220 million tonnes CO_2e) in forest biomass and dead organic matter. Another 30 million tonnes of carbon (or 109 million tonnes CO_2e) were transferred from the forest into forest products by converting timber into products.

Fire strongly influences year-to-year differences in carbon emissions and removals from Canada's managed forests. In 1992, a year of relatively few fires, net greenhouse gas inventory removals of CO_2e totalled 112 million tonnes. In 1995, when fire burned more than 2 million hectares, net greenhouse gas inventory emissions of CO_2e reached 171 million tonnes.

During the 1990–2010 period, annual gross emissions directly from wildfire ranged from a high of 263 million tonnes of CO_2e in 1995 to a low of 11 million tonnes in 2000.



Source: Natural Resources Canada–Canadian Forest Service

Forest sector carbon emissions

WHY IS THIS INDICATOR IMPORTANT?

Most experts agree that there is a strong link between climate change and activities that burn fossil fuels and emit carbon dioxide, methane, nitrous oxide and other greenhouse gases (GHGs). Fossil fuels include coal, refined petroleum products and natural gas.

Through harvesting, transporting and processing wood, the forest sector is one of the largest industrial users of energy in Canada. However, the sector's share of total GHG industrial emissions is considerably lower than its share of total industrial energy use because of its increasing use of bioenergy.

The sector's GHG emissions include: *direct emissions*, which result mainly from burning fossil fuels; and *indirect emissions*, which result mainly from burning fossil fuels to produce electricity purchased by the sector. The sector's direct and indirect emissions also include small amounts of methane and nitrous oxide from burning biomass for energy.

Monitoring the forest sector's GHG emissions is a necessary first step in improving its emissions record. As well, tracking emissions in the forest sector helps Canada measure its national emission levels and assess how these compare with its targets for GHG reductions.

WHAT HAS CHANGED?

A changing energy mix and greater energy efficiency are clearly reducing GHG emissions in the forest sector.

Note: The survey methodology used to inform Canada's Report on Energy Supply and Demand was changed in 2008. This directly affects the estimates for industrial energy use and electricity generation and indirectly affects the emissions estimates. As such, the time series data for 2008–2009 may not be completely consistent with data for earlier years.

Between 1990 and 2009, the sector's gross domestic product (GDP) fell 5% (measured in 2002 dollars). Much of the decline occurred between 2005 and 2009 tied to the decline in the U.S. housing market and to the global economic recession. In the same period, the industry's energy use fell by 19% as energy efficiency improved.

In 1990, fossil fuels accounted for 38% of the forest sector's direct and indirect energy needs. The other 62% of energy needs were met by bioenergy, hydroelectricity and nuclear power. By 2009, the fossil fuel share had fallen to 22% while the share of alternative fuels rose to 78%.

This switch in fuel types, together with increasing energy efficiency and reduced energy use during the global economic recession, resulted in the sector's overall GHG emissions decreasing by 51% between 1990 and 2009 (though the sector's contribution to GDP fell by 5% at the same time).

The forest sector's substantial cut in fossil fuel use between 1990 and 2009 helped reduce direct emissions by 63%. However, its increased use of electricity generated from fossil fuels in the same period resulted in a 5% increase in indirect emissions from this source.

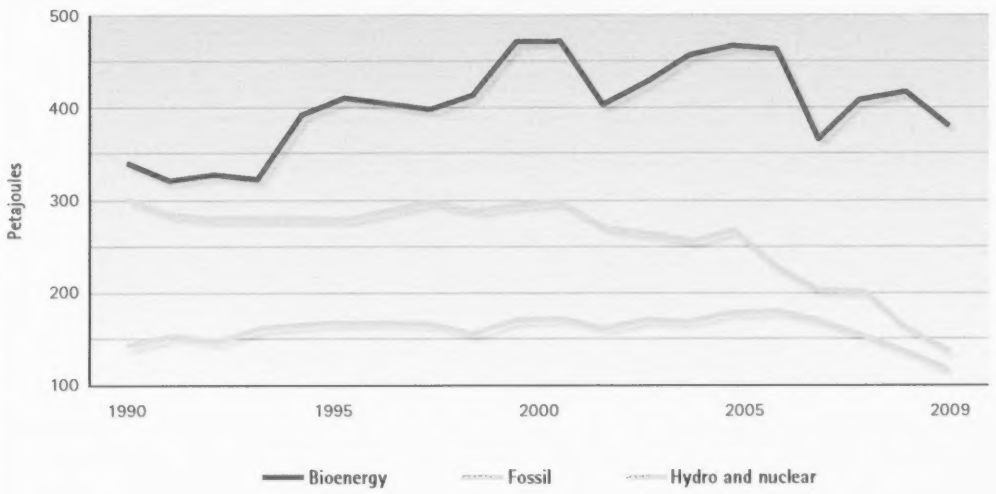
In 2009, the federal government announced the Pulp and Paper Green Transformation Program, a three-year initiative that provided pulp and paper companies in Canada with one-time access to $1 billion in funding to make environmental improvements to facilities, including improved energy efficiency and increased production of alternative energy. The program, which ended on March 31, 2012, demonstrated success on all counts, helping the country's pulp and paper mills improve their environmental and economic sustainability and be ready to tackle the next phase of transformation.

The federal government continues to invest in other forest industry projects that will help combat emissions in the future.

The projects completed under the Pulp and Paper Green Transformation Program are expected to enable mills to:

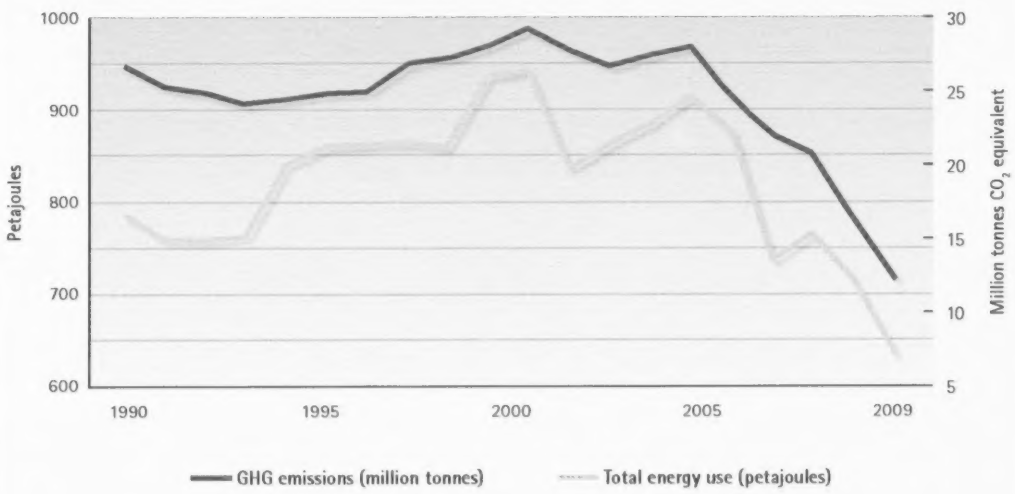
- be more energy self-sufficient (the amount of renewable electricity generated by the projects is enough to continuously power 140 000 homes)
- save more than 8.5 million gigajoules of energy a year from energy efficiency improvements
- decrease emissions of greenhouse gases (GHGs), particulates and odour-causing gases (the GHG emissions of the entire Canadian pulp and paper industry will be cut by more than 10% from 2009 levels)
- decrease the amount of water use, effluent discharge and waste sent to landfills.

ENERGY SOURCES IN CANADA'S FOREST SECTOR, 1990–2009



Source: Natural Resources Canada, Energy Sector, Office of Energy Efficiency

FOSSIL FUEL GHG EMISSIONS AND TOTAL ENERGY USE IN CANADA'S FOREST SECTOR, 1990–2009



Source: Natural Resources Canada, Energy Sector, Office of Energy Efficiency

ECONOMIC AND SOCIAL BENEFITS

Sustainable forest management means ensuring that forests provide a broad range of goods and services over the long term, including significant economic and social benefits.

Annual harvest of timber relative to the level of harvest deemed to be sustainable

WHY IS THIS INDICATOR IMPORTANT?

Regulating the amount of wood that can be harvested is central to sustainable forest management strategies. Tracking harvest volumes allows forest managers to determine whether these levels comply with regulated amounts.

Wood supply is the term used to describe the estimated volume of timber that can be harvested from an area while meeting environmental, economic and social objectives. In Canada, various planning processes are used to estimate wood supply, depending on the forest land's ownership and regulatory environment.

Provincial governments regulate harvest levels on provincial Crown lands by specifying an annual allowable cut (AAC), which is the annual level of harvest allowed on a particular area of Crown land over a specified number of years. In practice, annual harvest volumes may be above or below the AAC, but they must balance out over the regulation period.

Although no AAC is determined for Canada as a whole, it is possible to compare the aggregation of the provincial AACs across the country with the aggregated harvest from the same land base. Because AACs are set based on an assessment of a range of environmental, economic and social factors, they are only a proxy for the sustainable level of harvest.

Harvest volumes on private, federal and territorial lands are generally unregulated, although the managers of these lands may have commitments to meeting specific harvest targets. It is therefore difficult to determine the sustainable level of harvest on these lands.

To estimate Canada's total wood supply, provincial AACs on regulated lands are used as a proxy for wood supply on those lands, and wood supply on private, federal and territorial lands is estimated.

WHAT HAS CHANGED?

Canada's aggregate AAC for provincial Crown land in 2010 was about 206 million cubic metres, made up of 163 million cubic metres of softwoods and 43 million cubic metres of hardwoods.

Although softwood harvest volumes on provincial Crown land were relatively constant between 1990 and 2004 at about 130 million cubic metres per year, they fell steadily between 2004 and 2009. In 2010, softwood harvest volumes were 104 million cubic metres—23 million cubic metres higher than 2009 levels, but still well below the AAC.

The volume of hardwood timber harvested on provincial Crown land increased slightly between 2000 and 2004, peaking at 27 million cubic metres in 2004, well below the AAC. Harvest volumes declined rapidly between 2004 and 2009 before increasing slightly in 2010 to 18 million cubic metres.

Private, territorial and federal lands contributed an additional 14 million cubic metres of softwoods and 5 million cubic metres of hardwoods to the total volume of timber harvested in 2010.

Canada's total wood supply on all land types (provincial, territorial, federal and private) has been relatively stable since 2000, averaging about 243 million cubic metres per year, including 183 million cubic metres of softwoods and 60 million cubic metres of hardwoods.

Softwood harvests on all land types (provincial, territorial, federal and private) averaged 140 million cubic metres per year over the past 10 years (2001–2010), nearly 25% below the average wood supply estimated over the same period. Significant harvest declines between 2004 and 2009 as a result of the global financial crisis and related low demand for forest products meant that in 2009 only about 50% of the estimated sustainable wood supply was harvested. Although harvests rose in 2010, current volumes remain well below the estimated sustainable supply.

Hardwood harvests on all land types over the past decade have averaged 30 million cubic metres per year, 50% below the average annual estimated wood supply of hardwood. Similar to softwoods, hardwood harvests declined between 2004 and 2009 but increased in 2010, although current volumes remain well below the estimated wood supply of 57 million cubic metres per year.

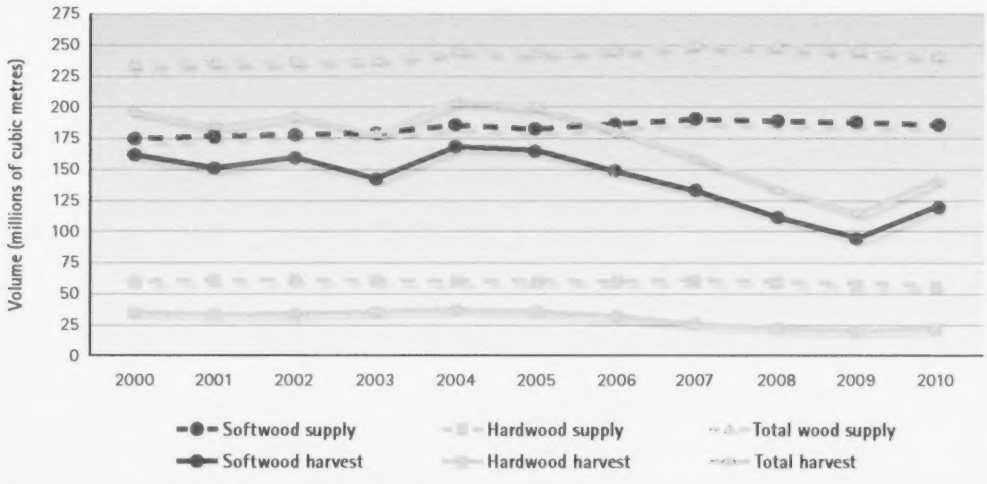
ANNUAL HARVEST AND SUPPLY VOLUMES OF SOFTWOOD AND HARDWOOD, 2010[a]
Note: Includes only industrial roundwood.

	Volume (million cubic metres)	Percentage change from previous year	Percentage change from the 10-year average[b]
Softwood harvest	119	26.2	-17.6
Hardwood harvest	23	8.9	-26.5
Softwood supply	185	-1.5	1.2
Hardwood supply	57	-2.9	-5.9

[a] *Includes all land types (provincial, territorial, federal and private).*
[b] *The period 2000–2009.*

Source: National Forestry Database

ANNUAL HARVEST VERSUS SUPPLY DEEMED SUSTAINABLE FOR HARVEST, 2000–2010[a]



[a] *Includes all land types (provincial, territorial, federal, private).*

Source: National Forestry Database

Certification

WHY IS THIS INDICATOR IMPORTANT?

Third-party certification assures buyers of Canada's forest products that the products purchased are from legal and sustainable sources. It complements Canada's rigorous forest management laws and regulations, and is embraced by companies as a way of further improving the sustainability of their forest management practices.

Three internationally recognized certification systems are used in Canada: Canadian Standards Association (CSA), Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI).

WHAT HAS CHANGED?

As of December 2011, Canada had 150.6 million hectares of forest certified under one or more of the three certification systems. This was an increase of nearly 730 000 hectares from 2010.

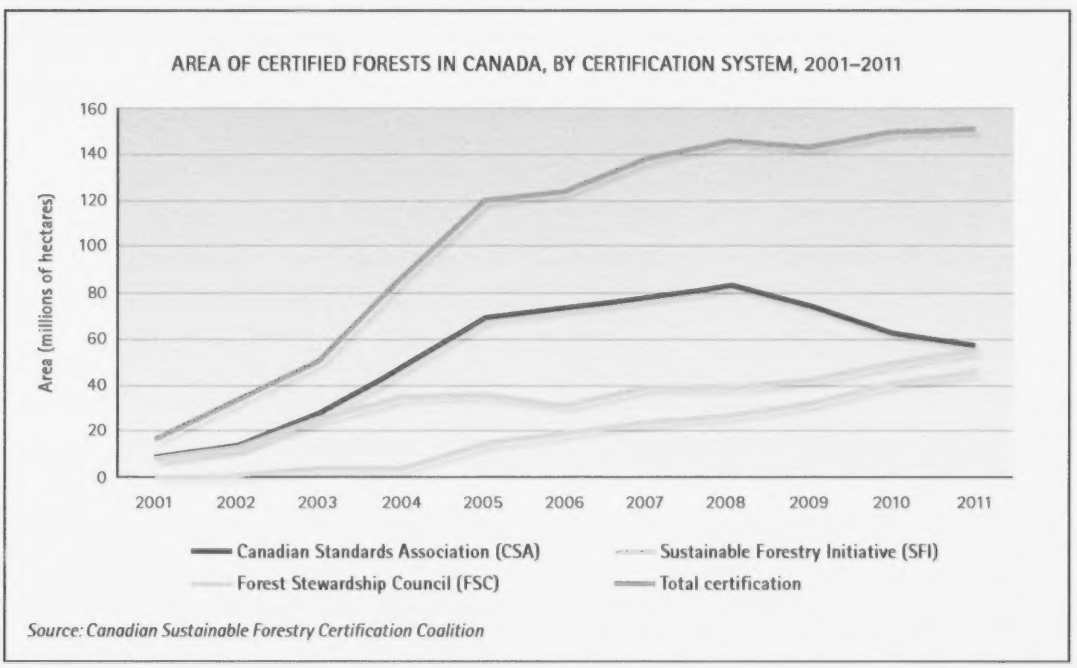
Canada has the largest area of certified forest anywhere: 40% of the worldwide total as of December 2011.

The CSA and SFI systems are endorsed by the international umbrella organization Programme for the Endorsement of Forest Certification Schemes (PEFC). The FSC's three regional systems—Canada Boreal, British Columbia, and Maritimes—have been accredited by FSC International. Canada has almost half of the world's PEFC-endorsed certifications and almost a third of the world's FSC certifications.

AREA OF CERTIFIED FOREST, 2011

Area (millions of hectares)	Percentage change from previous year	Average annual percentage change over previous 10 years
150.6	0.5	24.4

Source: Canadian Sustainable Forestry Certification Coalition



Source: Canadian Sustainable Forestry Certification Coalition

Contribution of forest products to gross domestic product

WHY IS THIS INDICATOR IMPORTANT?

The gross domestic product (GDP) is the market value of all final goods and services produced annually in a country.

The contribution of the forest product sector relative to the entire Canadian GDP shows the importance of the forest industry to Canada.

The three subsectors of the Canadian forest product sector consist of solid wood products (building products such as lumber and wood panels), logging (timber extraction, forest protection and regeneration), and pulp and paper.

WHAT HAS CHANGED?

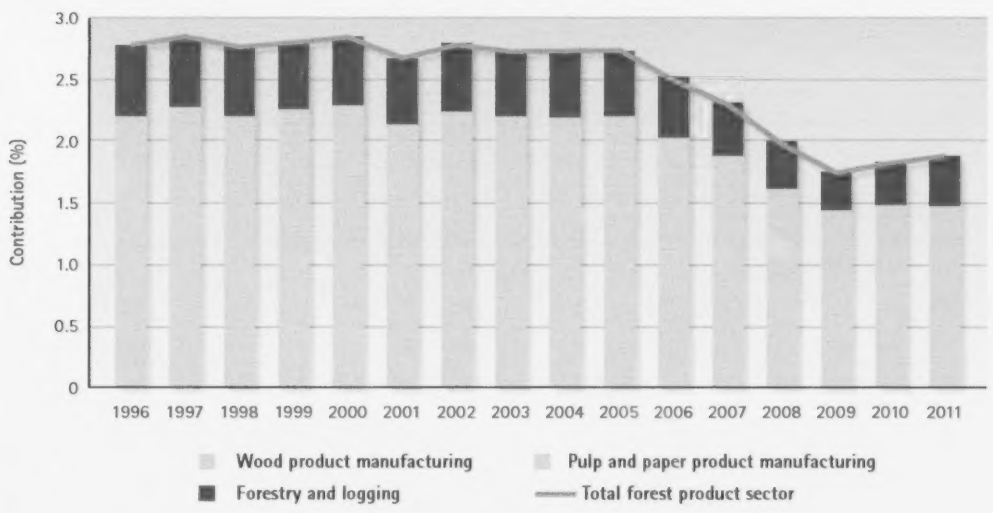
From 2005 to 2009, the forest product sector's share of GDP dropped significantly.

Until 2005, the contribution of the pulp and paper subsector (excluding newsprint) and solid wood subsector had been very stable. The U.S. housing crisis proved to be a severe challenge for the wood and logging subsectors, which declined to record lows in 2009 before stabilizing in 2010. The pulp and paper sector was similarly affected by the recession, and its prospects for recovery are mixed. The outlook is bright for certain traditional products (for instance, bleached softwood pulp) and non-traditional products (such as dissolving pulp), but less so for others (such as newsprint and office papers) where per capita consumption is declining as a result of a shift to electronic media.

In 2011, the forest product sector's contribution to GDP continued to improve from its 2009 record low and reached 1.9% of total Canadian GDP, at $23.7 billion. This was in large part the result of growth in Asian demand, continued global economic recovery, and the positive impacts of restructuring among forest sector firms.

This stabilization was also assisted by federal programs that promote the transformation of the Canadian forest sector. These include programs that support innovation (e.g., Investments in Forest Industry Transformation), enhance environmental performance (e.g., Pulp and Paper Green Transformation; Pilot-Scale Demonstration), and expand market opportunities (e.g., Canada Wood Export).

FOREST PRODUCT SECTOR CONTRIBUTION TO GDP IN CANADA, 1996–2011



Source: Statistics Canada, gross domestic product at basic prices, by North American Industry Classification System (2002)

Financial performance

WHY IS THIS INDICATOR IMPORTANT?

Canada's forest industry contributes significantly to the nation's economy. It is particularly important in many rural communities, where other industries and types of employment can be scarce.

Key measures of the forest industry's financial performance include *operating profits* and *return on capital employed*. High operating profits indicate that an industry's core business activity is in good health. High return on capital employed indicates that the industry is using its capital efficiently.

WHAT HAS CHANGED?

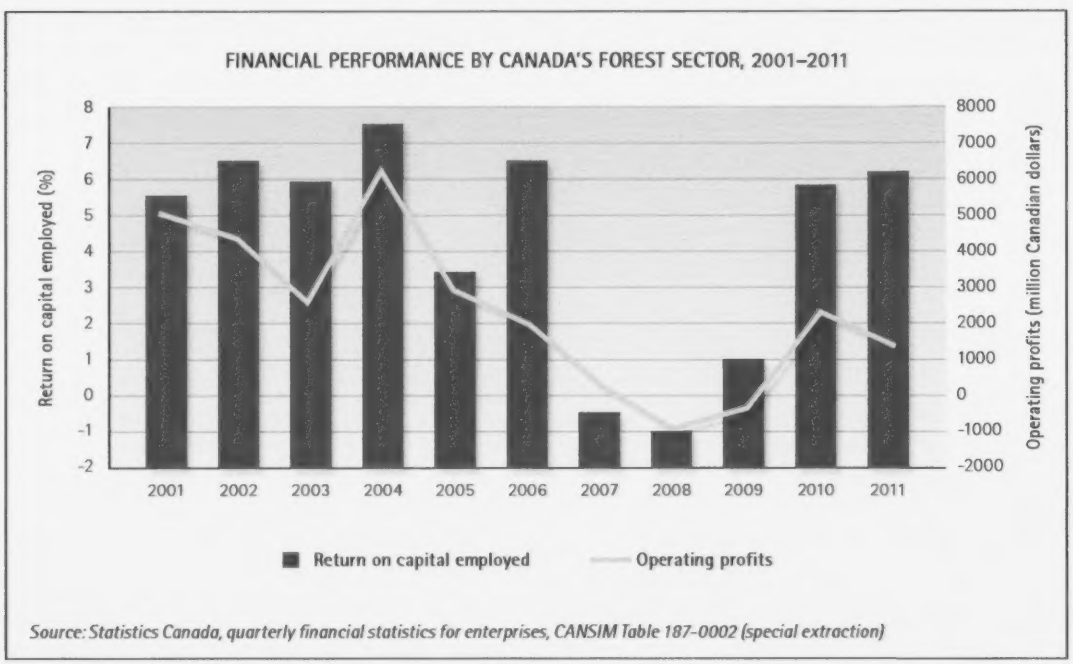
Canadian forest industry operating profits stood at $1.4 billion in 2011, down by 40% compared with that of 2010. However, that is still a considerable rebound compared with the negative operating profits recorded in 2008 and 2009. The return on capital employed continued to improve, reaching 6.2% in 2011, which is above the long-term average (4.8%) of the past 15 years.

The relatively weak operating profits in 2011 were primarily due to ongoing weakness in North American lumber markets as a result of the U.S. housing crisis, and to a decline in global pulp market prices because of emerging global overcapacity and slowing paper production. However, the improvements in return on capital employed highlight the success of industry-wide efforts to improve efficiency.

RETURN ON CAPITAL EMPLOYED, AS A PERCENTAGE, IN 2001, 2010 AND 2011

	2001	2010	2011
Return on capital employed	5.5%	5.8%	6.2%

Source: Statistics Canada, quarterly survey of financial statistics for enterprises, CANSIM table 187-0002 (special extraction)



Source: Statistics Canada, quarterly financial statistics for enterprises, CANSIM Table 187-0002 (special extraction)

Forest industry employment

WHY IS THIS INDICATOR IMPORTANT?

The Canadian forest industry is a major employer nationwide, particularly in many rural communities, where forest-related work is often the main source of income.

WHAT HAS CHANGED?

In 2011, direct employment in the Canadian forest industry fell slightly, by 1.8%, compared with 2010 levels.

Employment in wood product manufacturing, which has the largest share of employment in the Canadian forest industry (48.4%), remained largely unchanged from one year to the next, while employment in pulp and paper product manufacturing increased by 1.6%.

In contrast, employment in forestry and logging declined sharply, by 17.3%, and in support activities declined slightly, by 0.2%.

The main short-term factors contributing to the decline in forest industry employment were the ongoing weakness of the U.S. housing market, increases in labour productivity, and ongoing consolidation among service providers for trucking, logging and silvicultural activities.

Housing starts in the U.S. improved by 3.7% in 2011 over 2010, boosting demand for Canadian lumber and wood panel products somewhat, but full recovery is not expected before 2015.

Lumber exports to China and other overseas markets also helped bolster employment in the solid wood sector.

The growth of forest product exports to overseas destinations, most notably China, has helped sustain employment opportunities in the pulp and paper industry, offsetting declining North American demand for printing paper grades.

EMPLOYMENT (PERSON-YEARS) IN THE FOREST INDUSTRY, 2001 AND 2011

Employment	2001	2011
Direct	343 800	233 900
Indirect and induced[a]	530 000	360 600
Total	**873 800**	**594 500**

[a] *Estimate calculated by the Canadian Forest Service based on data from Statistics Canada Labour Force Survey.*

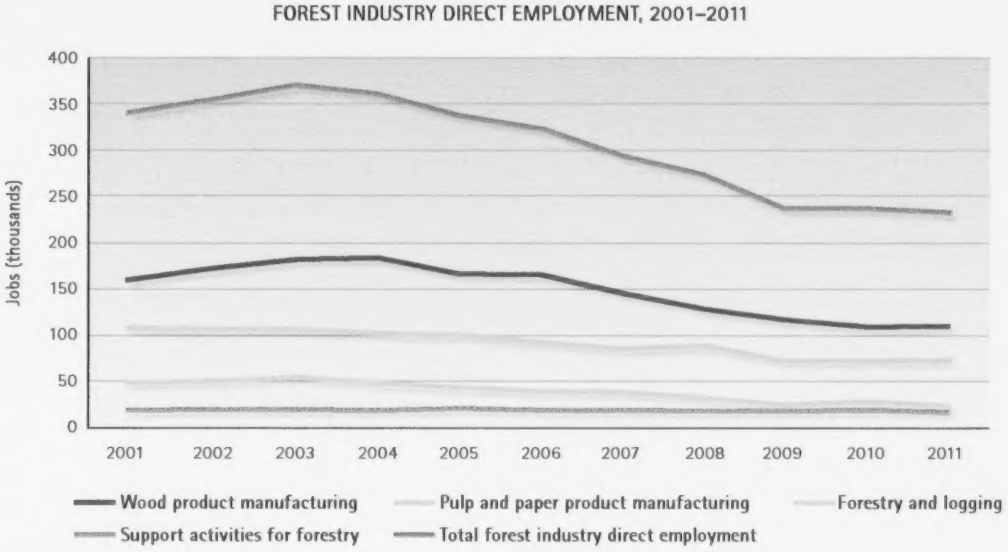
Source: Statistics Canada, Labour Force Survey, March 2012 (special extraction)

DIRECT EMPLOYMENT IN THE FOREST INDUSTRY, BY FOREST-RELATED SUBSECTOR, 2011

Subsector	Employment (person-years)	Percentage change from previous year[a]	Average annual percentage change over previous 10 years[b]
Wood product manufacturing	112 300	0.0	-3.6
Pulp and paper product manufacturing	75 100	1.6	-3.6
Forestry and logging	26 400	-17.3	-6.4
Forest industry support activities	20 000	-0.2	-1.1
Total[c]	**233 900**	**-1.8**	**-3.8**

[a] *Percentage change calculated based on raw data.*
[b] *The period 2001–2011.*
[c] *Total differs due to rounding.*

Source: Statistics Canada, Labour Force Survey, March 2012 (special extraction)



Source: Statistics Canada, Labour Force Survey, March 2012 (special extraction)

Forest product exports

WHY IS THIS INDICATOR IMPORTANT?

Canada's forest industry contributes substantially to the Canadian economy and forms the economic backbone of many rural communities.

By value, Canada is the world's leading exporter of softwood lumber, newsprint and wood pulp; and the fifth largest exporter of wood panels and printing and writing papers.

WHAT HAS CHANGED?

In 2011, the value of Canada's forest product exports increased slightly to $26.3 billion from $25.8 billion in 2010 (an increase of 1.9%).

Strong demand in Asia, particularly China, for a variety of forest products has continued to reduce the reliance on U.S. markets. As a result, the value of Canadian lumber exports to China increased by 61.2% over 2010, and the value of pulp exports increased by 22.9%. This more than offset the still decreasing printing and writing paper exports to the U.S., down 6.7% in 2011 from 2010.

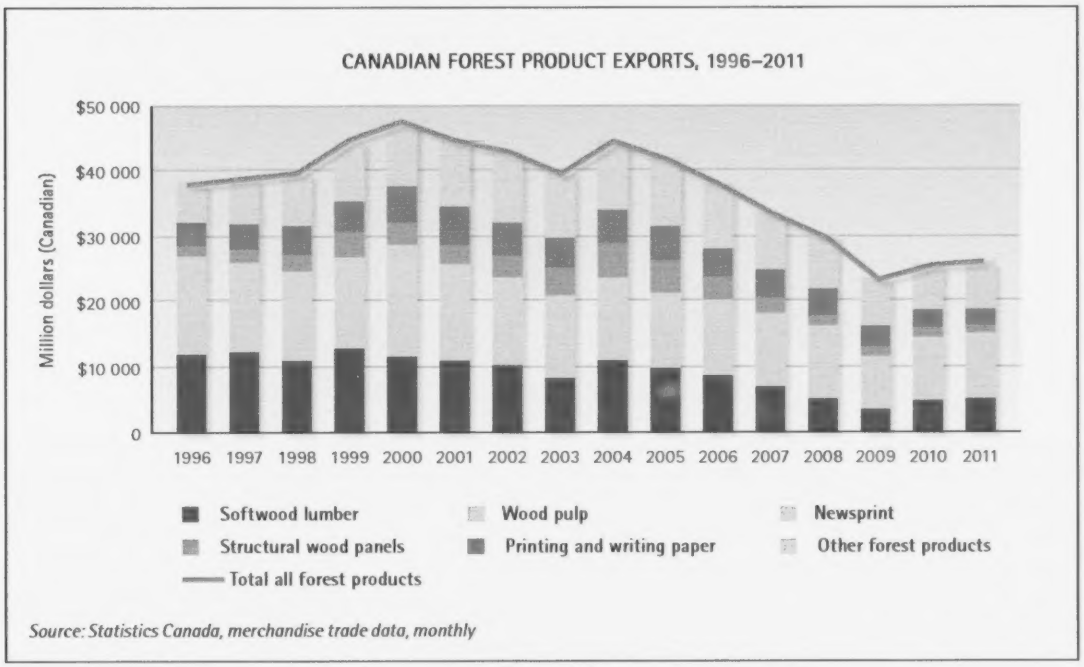
Canada has the largest share of the global northern bleached softwood kraft (NBSK) pulp market, with 31% of production. Demand for NBSK is expected to remain strong as demand for tissue and other health- and hygiene-related products continues to increase in China and other Asian countries.

EXPORT STATISTICS BY FOREST PRODUCT TYPE, 2011

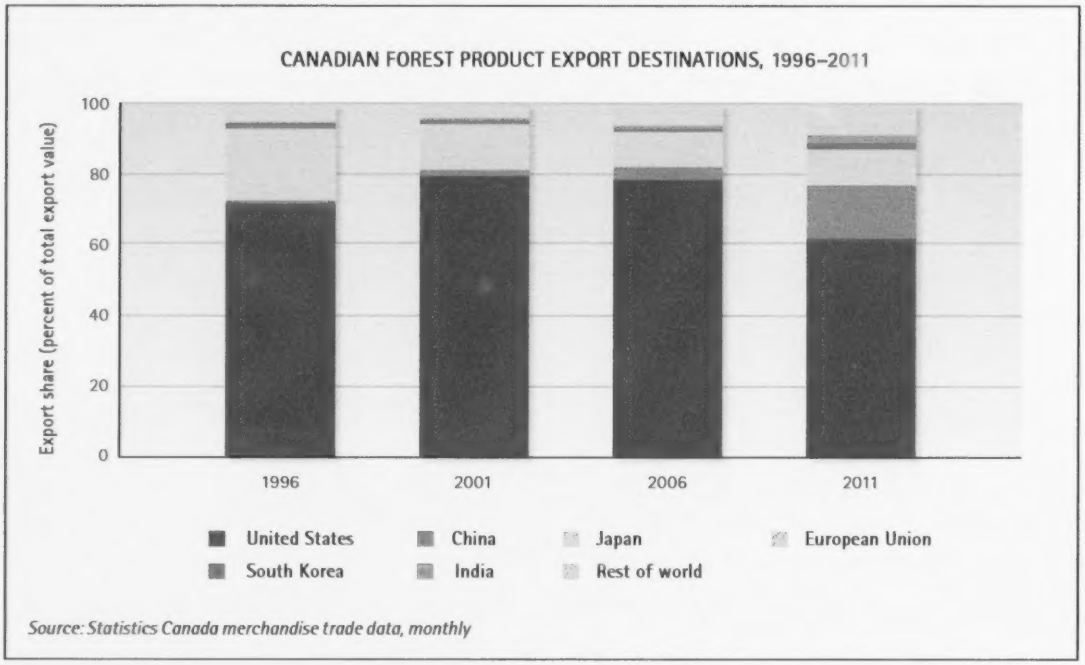
Forest product exports	Value (billion dollars)	Percentage change from previous year	Average annual percentage change over previous 10 years[a]
Wood pulp	7.2	2.8	-0.2
Softwood lumber	5.2	6.7	-7.3
Newsprint	2.8	4.8	-9.1
Printing and writing paper[b]	2.6	-7.2	-7.8
Structural wood panels	1.2	-10.1	-9.0
Other forest products[c]	7.3	1.8	-3.3
Total all forest products[c]	**26.3**	**1.9**	**-5.2**

[a] *The period 2001–2011.*
[b] *Estimate calculated by the Canadian Forest Service based on data for the past five years from the Pulp and Paper Products Council.*
[c] *Excludes non-timber forest products except Christmas trees.*

Source: Statistics Canada, merchandise trade data, monthly



Source: Statistics Canada, merchandise trade data, monthly



Source: Statistics Canada merchandise trade data, monthly

SOCIETY'S RESPONSIBILITY

Extensive forestry operations take place on Canada's public lands, and many rural communities depend on the forest for their well-being. It is therefore essential that forest practices reflect society's economic, social and cultural values.

Forest-dependent communities in Canada

WHY IS THIS INDICATOR IMPORTANT?

The forest industry is the main economic driver in nearly 200 Canadian rural communities. Sustainable forest management is particularly important to these communities because they are more likely than larger urban centres to suffer the costs of unsustainable practices, market fluctuations and environmental change. At the same time, the well-being of these forest-dependent communities is affected by how the impacts of disturbance (such as fire, insects and diseases and the cumulative influence of climate change) are assessed and addressed.

WHAT HAS CHANGED?

Between the 2001 census and 2006 census (most recent data available), the number of rural communities in Canada where the forest industry is the main economic driver fell from approximately 300 to fewer than 200.

The primary cause of this drop was the overall decline in the forest sector. Factors contributing to the decline include the strong Canadian dollar, greater global competition, a fall in U.S. housing starts and the impacts of the mountain pine beetle infestation.

Although some of these regions have suffered significantly in recent years, quality-of-life indicators show that, as a group, both current and former forest-dependent communities have seen no decline in well-being. Job growth in other sectors, particularly other resource sectors, has helped temper the impact from job losses in forestry. Many communities are also diversifying their economies—for example, by developing a range of non-timber forest-related values such as recreation, ecotourism and bioenergy.

Meantime, in 2010 and 2011, about 3200 people across Canada were called back to work as a result of 31 mill restarts. This positive sign is largely the result of increased demand for forest products from China.

WHAT DO THE INDICATOR DATA TELL US?

Our nation's forests offer Canadians a multitude of benefits—environmental, economic and social—and it is the goal of sustainable forest management to optimize and balance these benefits to meet both current and long-term needs.

All of the 13 indicators reported here present data for a minimum 10-year period, and in this way help create an informative profile of Canada's progress in carrying out sustainable forest management on a national basis. The data collected for this sample of indicators show that notable gains have been made in many areas while challenges remain in others.

Economic and social indicator data

Canada's forest sector has undergone substantial economic trials in the last decade. In 2011, however, encouraging signs of sector recovery and transformation appeared. Although segments of the industry continue to struggle (pulp and paper, for example), overall the contribution of the forest products sector to Canada's GDP rose, the value of forest product exports increased, and the industry's financial performance improved, particularly return on capital employed. These and related economic figures are still below their previous peaks, but an upward trend is clear.

Several factors have driven this favourable shift. Key among them: growth in Asian demand for Canada's forest products; continued economic recovery globally; and the positive effect that restructuring by many forest sector firms has had.

Federal programs that promote enhanced environmental performance, support infrastructure and technological innovation and expand market opportunities have also worked together to enhance the competitive position of Canadian companies.

Despite a decline in forest industry jobs in Canada in recent years, the sector remains a major employer nationwide, particularly in rural communities where forest-related work is often the main source of income. So, although the number of forest-dependent communities has dropped over the last decade as the sector has shrunk, the forest industry is still the main economic driver in nearly 200 such communities.

Many other communities also benefit from forest-related values and services, including recreation, ecotourism and bioenergy production.

As well, third-party forest certification continues to increase in Canada, sending the message to new and emerging markets that Canada's forest products come from legal and sustainable sources, and are produced through practices that comply with rigorous forest management laws and regulations.

Today Canada has the largest area of certified forest in the world: 40% of the world's total.

Ecological and environmental indicator data

Less than 0.2% of all forest and other wooded land in Canada is harvested each year. Total harvest rates remain well below the level of harvest deemed necessary for maintaining sustainable stands, and natural and artificial regeneration (that is, through seeding and planting) are ensuring that areas harvested remain productive and able to provide key ecosystem services, such as regulating water quality and quantity.

Deforestation (the permanent conversion of forest land mainly for agricultural use, resource extraction and urban expansion) has affected about 0.01% of all forest and other wooded land in Canada annually in recent years, and this rate is declining.

Forest disturbance caused by fire, insects or disease has had serious economic impacts in a number of areas (such as British Columbia's interior, affected by the mountain pine beetle epidemic). As well, some habitat loss and degradation associated with forest disturbance threaten several wildlife species in Canada. In all, 349 forest-associated species are currently at risk. Forest disturbances also influence the global carbon cycle.

However, natural forest disturbance processes are recognized today as being a normal part of forest renewal. Many forest management practices are therefore increasingly being designed to mimic natural disturbances, and in this way are helping to preserve the healthy attributes of Canada's forests and support the forests' ability to adapt to change.

As the indicator data also show, the forest sector has been making considerable progress in decreasing its reliance on fossil fuels, increasing energy efficiency and reducing energy use. The result is that the sector's overall greenhouse gas emissions have decreased by 51% during the past two decades.

Looking ahead

Sustainable forest management means working to balance the broad range of forest-related values within a constantly changing economic, environmental and social context. Canada is making progress in achieving this goal, but there is more to be done.

Industry transformation and innovation will continue—an effort that includes improving efficiency, developing new products and processes, and finding new uses and markets for traditional products.

The natural complexity of forest ecosystems, combined with ecological changes caused by factors such as climate change and invasive alien species, means that understanding how these ecosystems work and change is essential to ensuring future sustainability. Monitoring a range of indicators in this area will continue to track progress in this aspect of forest management.

Diversification of markets, a key component of the new vision for the Canadian forest sector, involves promoting the benefits and attributes of Canadian wood products abroad. Domestic and international markets expect forest products to come from sustainably managed forests. This is where the indicator data are most revealing, for they show overall that despite recent challenges, Canada is making significant progress in sustainable forest management. The forest sector continues to apply leading edge innovation to transform the industry, find new economic opportunities for Canadian forest products, and maintain a healthy and productive resource base.

ABOUT NATURAL RESOURCES CANADA—CANADIAN FOREST SERVICE

Forests and forest resources are integral to Canadian life. The Canadian Forest Service is a science-based policy organization within Natural Resources Canada, a Government of Canada department that helps shape the natural resources sector's important contributions to the economy, society and the environment.

For more than a century, the Canadian Forest Service has conducted research on the health of Canada's forests to ensure that our nation's forest sector needs are met without compromising the ability of future generations to meet their own needs.

Today, using scientific data and economic analysis, the Canadian Forest Service plays a leadership role in advancing a new model for the forest sector, focused on two key areas: sustainability and competitiveness.

In its work related to sustainability, the Canadian Forest Service uses knowledge of natural and human-caused forest disturbances to develop models, tools and advice for forest practitioners, as well as adaptation options for addressing climate change. It also ensures that policy decisions related to resource development and sustainability are based on sound research.

In its work on competitiveness, the Canadian Forest Service aims at increasing economic opportunities for the Canadian forest sector; adding economic value to the forest sector through innovation; integrating innovation efforts and institutions into a more effective national system; and addressing challenges and building on new opportunities for forest-based communities.

Made up of research scientists, technicians, economists, policy analysts and other dedicated professionals, the Canadian Forest Service develops and shares knowledge about forests and brings together stakeholders to address regional, national and global forest issues. Whether conducting research in the field, performing tests in the lab or analyzing information and data, Canadian Forest Service staff are working to ensure a healthy forest and a strong forest sector for Canada.

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